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arbeitet von † **E. Lemmermann** (Bremen), † **Jos. Brunnth**
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Groom, P., A preliminary inquiry into the significance of Tracheid-Caliber in Coniferae. (The Botan. Gazette. LVII. p. 287—307. 1914.)

The author gives the following summary:

1. There is considerable evidence that the width of the spring tracheids in evergreen Coniferae is largely decided by two factors, systematic affinity and available water supply. So far as the latter is concerned, the spring tracheids are generally narrowest in species of xerophilous habitat.

2. In American species of *Pinus* belonging to section I (*Haploxylon*), variation in the width of the spring tracheids runs quite parallel with difference of systematic affinity and of available water supply (including influences promoting transpiration). Thus the first step in the evolution of this section of *Pinus* would appear to have been a division into a more xerophilous type (ancestral *Paracembra*), and a less xerophilous type (ancestral *Cembra*), and each of these subsections would appear to have undergone similar division into more or less xerophilous groups, that is, into *Parva* and *Balfouria*, also *Eu-Cembra* and *Strobus*. The two East Indian species, *P. Gerardiana* and *P. excelsa*, structurally accord with this theory.

3, Among American species of *Pinus* belonging to section II (*Diploxylon*), those with narrow spring tracheids are more xerophilous in distribution, while those with the widest tracheids belong to a subtropical or tropical moist climate. Though in general this section of *Pinus* supports the theory given in paragraph 1, there are in it certain species in which width of tracheid does not appear to correspond with the supply of available water. Such discrepan-

cies, whether real or only apparent, may be due to one or more of the intervening causes mentioned in paragraph 6.

4. Species of other North American genera of evergreen Coniferae show differences in the width of spring tracheids that may possibly be partly due to differences in affinity; as species of the same habitat, but belonging to different genera, may differ considerably in tracheid width, or, on the other hand, may approximate to agreement. Some of these genera, namely, *Torreya, Chamaecyparis, Sequoia* and *Juniperus,* support the view that the width of the spring tracheid is correlated with available water supply; somewhat favoring the view are *Cupressus* and *Picea*; indifferent in indication are *Abies* and *Larix.*

5. The theory here propounded derives support from measurements of the width of the spring vessels of American deciduous species of *Quercus.* For narrowness and wideness of spring vessels in the main are respectively associated with scantiness and abundance of water supply. But in the same kind of habitat the deciduous black oaks would seem to have narrower spring vessels than are possessed by the deciduous white oaks.

6. Though the evidence as a whole strongly favors the theory here propounded, much fuller information is necessary before a safe conclusion may be drawn. Hence this inquiry and the suggestions here given must be regarded as tentative and issued in the hope of stimulating inquiry in regard to factors that may intervene, such for instance as the following: climate (including evaporation power), exact soil water-content, level of water-table, etc., that form the environment of the different species of conifers; also, depth of root, duration of foliage and size of aggregate leaf surface, rate of transpiration, width of sap wood, etc., in the different species; also, variations within one and the same species in regard to the features just mentioned, as well as in the width of the spring tracheids, in different habitats. Jongmans.

Burlingame, L. L., The Morphology of *Araucaria brasiliensis*. II. The ovulate cone and female gametophyte. (The Botan. Gazette. LVII. p. 490—508, with Pl. XXV—XXVII, and 2 figs. 1914.)

The ovule possesses a very free nucellus with a glandular tip, a single integument adherent to the scale for almost its entire length, a ligule, a large micropyle, and spongy tissue surrounding the gametophyte.

There is probably a single functional megaspore, which develops into an embryo sac with about 2000 free nuclei before cell-formation. Cell-formation follows on a peculiar centripetal growth of the cytoplasma and precedes wall-formation. The first walls are formed on the surface of the free cells. Secondary walls are formed on the spindles of the mitoses occurring in the primary cells of the peripheral regions of the gametophyte. The outer cells are uninucleate, the inner ones are multinucleate.

The archegonia have single-tiered necks, usually, consisting of about 12 wedge-shaped cells. The necks are on the surface of the prothallus but are often overgrown. The archegonia may be single or occur in complexes and have a single-layered jacket. A ventre canal nucleus may be absent.

At the end of his paper the author briefly discusses the re-

semblances and differences between *Araucaria* and some other *Coniferales*. It differs from *Agathis* in the length of time (approximately 21 months) taken to mature seeds from the first appearance of the seed cone.

The very considerable number of free nuclei before cell formation, taken with the very large gametophyte, reminds a character of more primitive gymnosperms. The manner in which the free nuclear stage passes into a gametophyte with walled cells is apparently different from that reported for any other plant.

The author thinks it scarcely credible that the type of ovule which has a specialized pollen chamber securely hidden away at the base of the scale, and which can be reached by pollen only by means of special devices, is a primitive type. Such a structure is too complex for a first step in the evolution of the ovule and seeds.

Imbedded archegonia have not been found. They are superficial in origin and become overgrown by the neighbouring cells. Identical conditions have been reported in the podocarps. The necks show a closer resemblance to those reported for *Podocarpus*, than to those of most other conifers.

Ventral canal nuclei have not been found, but it seems probable that they will yet be found.

The gametophyte appears to be neither highly specialized nor exceptionally primitive in its structure. The large size and numerous and large archegonia are offset by the late development of walls and their persistent delicacy, by the apparent lack of a ventral canal cell, and by the rather specialized necks of the archegonia. Probably it presents more resemblances to the gametophyte of the *Taxaceae* and to those of the *Taxodineae* than to other conifers. Jongmans.

Cook, O. F., Jointed leaves of *Amygdalaceae*. (Journ. Wash. Acad. Sc. II. p. 218—220. 1912.)

The leaf-bases of the *Amygdalaceae* (plum, peach, apricot) are able to persist because of the joint that allows the petiole to separate and fall of with the blade at the end of the season. At San Antonio, Texas, where these facts were first noticed, the persistent leaf-base of the peach remains alive for a year or for two but finally dies and withers away. In Maryland peach trees the petiole base lives through the winter and separates when the buds start in the spring, leaving a fresh green leaf-scar.

The apple and its relatives do not share these specialised leaf characters of the stone fruits. There is no joint above the attachment of the stipules and basal section of the leaf falls off with the rest. In these cases there could be no question regarding the attachment of the stipules to the petiole.

Another fact that may indicate greater complexity of leaf structure among the ancestors of the *Amygdalaceae* is the presence of small oblong or spatulate leafy organs on the upper part of the petiole, taking the place of nectaries. In some varieties of apricots these small accessory blades are of frequent occurrence. They suggest the possibility that the nectaries of the petioles of *Amygdalaceae* may correspond to the marginal glands of the blade and may represent rudiments of divisions of compound leaves. If this be true the petiole in this group may correspond to the rachis of

a compound leaf rather than to the more specialized petioles of some of the simple-leaved families. M. J. Sirks (Haarlem).

Cook, O. F., Pomegranate flowers dimorphic. (Journ. Wash. Acad. Sc. II. p. 434—437. 1912.)

Though it seems quite improbable that such a specialization should not have been described before, the existence of two forms of flowers in the pomegranate is not recognized in the chief works of reference. The two forms of flowers can be distinguished by the shape of the buds long before the time of opening. In perfect flowers the style is long and the stigma is carried out beyond the mass of stamens. This makes it possible for the stigma to be exposed as soon as the calyx opens, and while the stamens are still completely covered by the infolded petals, an arrangement obviously favorable to cross-fertilization. In the other type of flowers the ovaries are poorly developed and have only minute rudimentary ovules that degenerate and shrivel; the styles are much shorter than in the perfect flowers.

The staminate form of flowers was much more numerous on most of the bushes and some of them had none of the perfect flowers, so that no fruit could be set. Thus the pomegranate may be considered as a polygamodioecious plant, to the extent that a large proportion of the flowers no longer produce functional pistils. On the other hand, the perfect flowers show no apparent tendency to lose the staminal function. It is as though a simple dimorphism of short and long styles had been followed by a further reduction of the pistils and ovules of the shortstyled flowers, until the reproductive functions were lost.

The bearing of the dioecious tendency upon the problem of breeding fruiting varieties of pomegranates is obvious. Failure to produce a sufficient number of the fertile flowers would render a variety unproductive, though it might blossom abundantly. On the other hand, the possibility that some varieties require cross-fertilization, should receive consideration. M. J. Sirks (Haarlem).

Lundegårdh, H., Zur Mechanik der Kernteilung. (Svensk Botanisk Tidskrift. VIII. 2. p. 161—180. Mit Textfig. 1914.)

Verf. experimentierte mit *Vicia faba.* Gipste er die Wurzeln ein, so fand eine Hemmung der Kernteilungen statt. Letztere ist auf eingestelltes Zellwachstum und Abnahme der Karyotin-Synthese zurückzuführen. Dagegen fahren die Karyotinlokalisation und die Gestaltsveränderungen der Karyotinelemente (also zwei für die Prophase charakteristische Erscheinungen) fort. Die selten auftretenden Spireme sind in den so behandelten Wurzeln sehr dickfädig. Solche Spireme mit sehr kurzen und dicken, ganz freien Chromosomen treten in Wurzeln auf, die bei 36° C gehalten wurden. Auch hier findet eine Hemmung des Membranwachstums und der Karyotinsynthese, sowie der Teilungserscheinungen im Plasma statt. Dazu tritt eine Lähmung der Karyotinlokalisation und der gestaltenden Kräfte in Interphase und Prophase ein. — Die prophasische Orientierung der Spiremfäden ist z. T. auf innere autonome Symmetrieverhältnisse zurückzuführen, die namentlich in den bei hoher Temperatur gehaltenen Wurzeln sehr deutlich hervortreten. — Die

Chromosomengestalt wird bei der Nachwirkung nach dem Chloralisieren stark verändert. Die Chromosomen werden viel kürzer als normal. Bei der 3 Tage fortdauernden Nachwirkung finden auch abnorme Mitosen statt, die darauf beruhen, dass die plasmatischen Teilungsfunktionen gelähmt sind, dagegen nicht die Teilungserscheinungen der Chromosomen. Dabei werden abnorme (nicht x-ploide) Zahlen veranlasst. Die Teilungsgeschwindigkeit der diploiden Zellen ist grösser wie diejenigen der didiploiden Zellen. Němec's Befunde über eine autoregulative Reduktion der Chromosomenzahl in didiploiden Zellen wird nicht bestätigt.

Matouschek (Wien).

Martin, J. N., Comparative Morphology of some *Leguminosae.* (The Botan. Gazette. LVIII. p. 154—167. Pl. VIII—XI. 1914.)

This investigation covers the development of the embryo sac, embryo and endosperm of *Trifolium pratense, T. hybridum, T. repens, Medicago sativa* and *Vicia americana.* Each species is described for itself. At the end of the paper a discussion of the results of this investigation and of that of other authors is given, followed by a summary, in which are mentioned the features common to the 5 species and those, in which they are different.

Features common to the 5 species are as follows: 1 campylotropous ovules; 2 two integuments, the outer preceding the inner; 3 a multicellular archesporium; 4 one parietal cell cut off, which gives rise to more or less parietal tissue; 5 the production of a row of 4 megaspores; 6 the rapid destruction of nucellar tissue, which brings the embryo sac in contact with the inner integument; 7 antipodals ephemeral.

Contrasting features are as follows: 1 The number of ovules is always 2 in *Trifolium pratense,* but more than 1 and various in the other species. 2. The third megaspore sometimes functions in *T. repens.* 3. In *Trifolium* the embryo sac rapidly destroys the antipodal end of the nucellus and thus forms a long tubular sac. 4 In *Trifolium* the embryo sac remains very vacuolate, while in *Vicia* and *Medicago* the sac fills with cytoplasm. 5. Polars meet on median line or on inner side of sac in *Trifolium,* but rest near the egg apparatus; in *Medicago* the polars meet near the center of the sac and rest near the egg apparatus; while in *Vicia* they meet on the inner side of the sac and remain some distance from the egg apparatus. 6. In *Trifolium* and *Vicia,* the starch appears in the micropylar end of the nucellus and in the inner integument, while the starch fills the sac in *Medicago.* 7. In *Trifolium* the proembryo is short and massive and no definite line between suspensor and embryo was made out; more evidence of the separate parts was seen in the more slender proembryos of *T. hybridum* and *T. repens.* 8. Definite suspensors with multinucleate cells appear in *Medicago sativa* and *Vicia americana*; in the former species the suspensor is filamentous, but composed of 2 superimposed pairs of cells in the latter species. 9. Sterilization ist most marked in *T. pratense.*

Jongmans.

Brown, W. H., The phenomenon of fatigue in the stigma of *Martynia.* (Philippine Journ. Sci. C. Bot. VIII. p. 197—201. 1913.)

Experimental studies upon the closing response and subsequent opening of the stigma lips of *Martynia proboscidia,* with a demon-

stration of fatigue or exhaustion after successive stimulations. The lips were mechanically stimulated to bring about closure, and the time-period required for them to return to their original position determined. The first few stimuli result in increased rapidity of opening; then opening becomes gradually slower after each successive closure, and finally there is a rather sudden loss of the power of movement. Sam F. Trelease.

Burns, G. P., The relative transpiration of white pine seedlings. (Plant World. XVIII. p. 1—6. 1915.)

Studies involving measurements of evaporation from white and from black cylindrical porous cup atmometers placed among seedlings of white pine in three degrees of light, and also determination of transpiration and of chemical composition of these seedlings. The approximate amounts of water transpired per seedling, in "no-shade", in "half shade", and in "full-shade" respectively, were found to be in the proportions of 21, 8, and 1, while the corresponding dry weights produced were approximately proportional to 6, 3, 5, and 1. The corresponding ash contents, in per cent. of dry weight, were 8.29 %, 9.35 %, and 10.20 %, making the total amounts of ash obtained proportional to 5, 3, and 1, respectively. Thus with a water absorption of 20 the ash content is only five times as great as with an absorption of unity, etc. Nitrogen content, in per cent., of dry weight, was 2.18 %, 2.70 %, and 6.89 % under the three conditions, respectively. The author draws the conclusion that "the explanation of the differences in size and chemical composition of the three groups of trees must be sought along the line of photosynthesis and assimilation, rather than along the line of absorption and transpiration". Sam F. Trelease.

Hill, G. R., The relation of ventilation to the keeping qualities of fruits and vegetables. (Washington University Studies I. p. 46—64. 1913.)

Experimental studies upon the keeping qualities of fruits and vegetables in relation to insufficient oxygen and to an accumulation of carbon dioxide, attempting to explain the injury occuring to fruit in refrigerator cars as due to lack of proper aëration. It was found that apples, peaches, and lettuce kept well in air, but spoiled quickly in nitrogen, hydrogen, and carbon dioxide, the injury not being due to microörganisms. A study was also made of the production of carbon dioxide by fruits in air, in nitrogen, and in hydrogen. Cherries, blackberries, and grapes produced as much carbon dioxide in nitrogen and in hydrogen as in air, while green peaches produced only about half as much carbon dioxide in the absence of oxygen as in its presence. Carbon dioxide was produced less rapidly by grapes than by cherries, and the latter spoiled more quickly than the former. It is suggested that, since enzymes are supposed to produce the injury, the rate of "spoiling" in fruits is more or less directly proportional to the content of carbon dioxide producing enzymes. Sam F. Trelease.

Lehenbauer, P. A., Growth of maize seedlings in relation to temperature. (Physiol. Res. I. p. 247—288. f. 1—5. 1914.)

The fact that different investigators of the relation of tempe-

rature to growth in plants have obtained widely varying results, both as to the position of the optimum temperature and as to the nature of the graphs obtained, led the author to this study of the relations holding between constant temperatures, lengths of exposure periods, and growth rates of *Zea Mays* seedlings. The latter were grown in the dark, careful attention being paid to keep temperature, humidity, and other conditions constant. The thermostats used were capable of ready change when desired and were so adjusted as to maintain the temperature of the plant chambers within a range of fluctuation of 0.5° C. Measurements of growth increments of the shoots were made hourly in most cases, and observation was continued for periods ranging in length from 12 to 39 hours.

The graphs obtained showing the relation between temperature and average hourly growth rate give no indication of a double optimum temperature for growth, as is shown in Koeppen's earlier curve for maize seedlings. They show a rounded or flattened apex, such as Koeppen's curve would show if conventionalized. The optimum temperature for a 3-hour period of exposure was found to be 29° C., for 9 and 12 hours of growth, 32° C.

Van 't Hoff's law (that chemical reaction velocity is doubled or trebled by each rise in temperature of 10° C.), was found to apply for medium temperatures to the growth process in maize seedlings; within the temperature range of 20° to 32° the value of the coefficient varies from 2.40 to 1.88.

The maximum temperature for growth was found to be 43° C. for an exposure period of 15 hours, while 42° is the corresponding maximum for 18 hours.

The alteration in the mean hourly growth rate with prolonged exposure to constant temperature is brought out by tables and graphs. The initial rise in this mean rate is very rapid but the curves become less steep as the curve maximum is approached, this maximum being reached in a shorter period with higher temperature. A full bibliography is appended. Sam F. Trelease.

Muñoz del Castillo, J., Einfluss des Thoriums auf das Pflanzenwachstum. (Internation. agrar.-techn. Rundschau. V. 7. p. 944—945. 1914.)

Versuche mit Gerste wurden im radiologischen Universitäts-Institut von Madrid ausgeführt. Die Samen wurden in 2 mit Erde gefüllte Topfe aus gebranntem Ton eingelegt. In den einen wurde vorher ein wenig Thorium gegeben. Die hier gewonnenen Samen kamen wieder in 2 Töpfe, von denen der eine wieder etwas Thorium erhielt. Die 3. Generation der Gerste, die dem Thorium ausgesetzt war, zeigte eine so starke Entwicklung der Blätter, dass man sie für eine neue Sorte hätte halten können. Das Wachstum wird also gefördert, ja noch mehr als bei Anwendung von Radium, u. zw. auch das Wachstum der Nachzucht. — Es gibt sicher viele Böden, die von Natur aus Thorium-Emanation zeigen; man müsste solche für Saatzucht verwenden. Doch stehen Untersuchungen von Böden in dieser Hinsicht noch aus. Matouschek (Wien).

Shive, J. W., An improved non-absorbing porous cup atmometer. (Plant World. XVIII. p. 7—10. f. 1. 1915.)

Description of a new form of rain-correcting atmometer in which

the automatic mercury valves that prevent water, absorbed by the porous cup in times of rain, from entering the reservoir are contained within the reservoir itself. Liability or breakage and difficulty of adjustment are reduced to a minimum in this instrument.

Sam. F. Trelease.

Holden, R., Contributions to the Anatomy of Mesozoic Conifers. II. Cretaceous lignites from Cliffwood, New Jersey. (The Botan. Gazette. LVIII. p. 168—177. Pl. 12—15. 1914.)

The author gives the following summary at the end of the paper:

An *Araucarioxylon* from the Raritan Cretaceous of Cliffwood, New Jersey, shows bars of Sanio near the pith of the stem, similar to those in the cone axis of the living *Araucarineae.*

Brachyoxyla from the same locality are as a rule very similar to those from Kreischerville, Staten Island, differing only in such details as arrangement of medullary sclerites and structure of the bast.

The *Cupressinoxyla* of Cliffwood all lack cellulose bars of Sanio in the mature wood, and should on that account be placed in the new genus *Paracupressinoxylon.*

The occurrence of 3 absolutely typical *Pityoxyla,* and not a single typical *Araucarioxylon,* among these lignites seems to indicate that in thracing back the families of living conifers it is the *Abietineae* which remain unchanged, and the *Araucarineae* which become less and less like living representatives of that family. The same conclusion may be drawn from a consideration of the lignites of Staten Island.

The variety of structure of these Mesozoic araucarians has its bearing on the question of the monophyletic or diphyletic origin of the *Coniferales.* There are certain features, which have been supposed to sharply differentiate the araucarians from the other families. Both fossil and comparative anatomical evidence demonstrate the fallacy of this view. As regards wood structure, every feature of the *Abietineae* — resin canals, bars of Sanio, thick-walled pitted rays, wood parenchyma (terminal and diffuse), even to as small and unimportant details as fusion pits in the rays and regularly alternating bands of hard and soft bast — has been found in the *Araucarineae,* living or extinct. As regards strobilar anatomy, Eames has shown that the stages in the reduction of the female cone are closely paralleled in various cupressineous and taxodineous genera, and the writer has shown that in one Mesozoic araucarian (*Voltzia*) there was a double cone scale, like that of the living genus *Cryptomeria.* In view of all the facts, it seems evident that the conifers, as a whole, are derived from the same ancestral stock, and that the *Abietineae* are more like that stock than the *Araucarineae.*

Jongmans.

Bail, T., Ueber die Hexenbesen der Edeltanne. (Oesterr. Gartenzeit. X. 10. p. 156—160. 2 Fig. Wien 1915.)

In der Einleitung ein Beitrag zur Geschichte des Edeltannenrostes (*Aecidium elatinum*) — Verf. sah die Hexenbesen in Menge auf den Edeltannen bei Wildbad im Schwarzwalde, ohne dass man dort gegen das Uebel ankämpft. Die „grosse Tanne" im Roll-

Chromatophoren, die in der Peripherie der Zellen, ungefähr tetraëdisch angeordnet, liegen.

Das erste untersuchte Stadium der Teilung der Sporenmutterzellen ist die Synapsis, die hier ungefähr das gewöhnliche Aussehen hat, wie es bei den Phanerogamen beschrieben wird.

Schöne Strepsinestadien hat der Verf. beobachtet.

Von den beiden Theorien der Chromosomenbildung der Spaltungstheorie und der Faltungstheorie, scheint dem Verf. jene für *Sphagnum squarrosum* die wahrscheinlichste zu sein.

In der Diakinese liegen die Chromosomen in deutlichen Tetraden; die der homöotypischen Teilung sind hier schon sichtbar.

Die heterotypische Spindel ist als fertiggebildet bipolar, gewöhnlich scharf zugespitzt und an zwei Chromatophoren befestigt.

Die Chromosomenzahl ist bei *Sphagnum squarrosum* 20.

Die Spindeln der homöotypischen Teilung sind immer an je zwei Chromatophoren befestigt.

Jeder der neugebildeten Tochterkerne kommt an je einem Chromatophor zu liegen; jede Spore erhält folglich nur einen Chromatophor, wie bei *Anthoceros* und den untersuchten Laubmoosen.

Zwischen den beiden homöotypischen Spindeln kommt immer eine dichte Kinoplasmamasse vor. Sie wird durch die primären äquatorialen Anschwellungen der Spindelfasern der heterotypischen Spindel gebildet. Diese vereinigen sich zuerst zu grösseren Körpern, welche ihrerseits mit einander verschmelzen. Die so gebildete Kinoplasmamasse besteht aus einem flächenförmigen, etwas vakuolisierten Körper, der strahlenförmig Fäden in das Zytoplasma aussendet, und in einer Ebene, die senkrecht zu der Längsrichtung der heterotypischen Spindel ist, liegt. Im Querschnitt erscheint sie folglich auf den ersten Blick als eine unvollständig entwickelte Zellwand. In der Telophase der homöotypischen Teilung wird die Platte aufgelöst; wahrscheinlich nimmt sie jetzt an der Wandbildung teil.

Im Kap. „Zur Kenntnis der Chromatophoren" behandelt der Verf. besonders das Verhalten der Chromatophoren des Sporophyten. Die Zellen des jungen Sporophyten enthalten wie die Eizelle mehrere Chromatophoren. Im jungen Archespor aber scheinen sie sich nicht zu teilen, sondern verteilen sich auf die Tochterzellen, so dass es in jeder Archesporzelle endlich nur ein Chromatophor gibt; die sterilen Sporophytenzellen dagegen haben immer mehrere Chromatophoren. In den Sporenmutterzellen vermehrt sich die Anzahl von einem auf vier, und jede der vier jungen Sporen enthält, wie genannt, einen. Dieser Tatsache legt der Verf. eine grosse systematische Bedeutung bei.

Betreffs des Antheridiums vollziehen sich die ersten Teilungen des Körpers, wie es Leitgeb beschreibt. Es bildet sich eine zweischneidige Scheitelzelle; die Divergenz der Segmente ist jedoch nicht $\frac{1}{2}$, sondern bedeutend kleiner.

Jedes Segment wird später, wie bei den Laubmoosen und den *Jungermanniales*, durch zwei bogensehnenartig verlaufende Wände in drei Zellen geteilt, zwei äussere und eine innere.

Die Androzytenmutterzellen (sensu Allens) sind langgestreckt ellipsoidisch, wie bei den Laubmoosen, und ihre Spindeln sind in deren Längsrichtung orientiert.

In den Androzytenmutterzellen erscheinen im Zytoplasma zwei stark färbbare Körper, von denen in den vorhergehenden Mitosen keine Spur zu sehen war. Der Verf. benennt sie Blepharoplasten,

da sie seines Erachtens den in den Androzyten (sensu Allens) auftretenden zilienbildenden Körpern identisch sind.

Was die systematische Stellung von *Sphagnum* betrifft, so ist der Verf. der Ansicht, *Sphagnum* sei ein echtes Laubmoos und habe sich aus einem Laubmoosartigen Typus entwickelt. Ausser den gewöhnlich hervorgehobener habituellen Aehnlichkeiten usw. möchte er das Verhalten der Chromatophoren betonen. Der Umstand, dass er deren viele in den sterilen Zellen des Sphorophyten und in denen des Gametophyten und nur einen in den ruhenden Zellen des sporogenen Gewebes gibt, knüpft das Band zwischen *Sphagnum* und den eigentlichen *Musci* fester. Dazu kommt die Entwicklung der Antheridien, die hauptsächlich dieselbe ist: ihr Körper ist durch eine zweischneidige Scheitelzelle gebildet, und die ersten Androgonen (sensu Allens) entstehen aus den primären Segmenten durch das Bilden zwei bogensehnenartig verlaufender Wände. Endlich haben die Androzytenmutterzellen dieselbe ellipsoidische Form, und die Kernspindeln sind in derer Längsrichtung orientiert.

Der Meinung des Verf. nach muss man sich *Sphagnum* als mutatis mutandis ein Laubmoos denken, das in dieser oder jener Weise für die periodische Xerophilie und den Nahrungsmangel des Hochmoores ausgebildet worden ist. Bei welchem Typus oder in welcher Gruppe der Laubmoose man die nächsten Verwandten zu suchen hat, ist jedoch unsicher. Autoreferat.

Persson, H., Blattmossfloran i sydvestra Jemtland och angränsande delar af Herjedalen. (Arkiv Botanik. LIV. 3. p. 1—70. 6 Textfig. Stockholm, 1915.)

Verf. hat die alpinen Gegenden des südwestlichen Jemtland und des nordwestlichen Herjedalen bryologisch untersucht und gibt ein Verzeichnis der Laubmoose, die er dort gesammelt hat. Für das Gebiet sind 243 Laubmoose vom Verf. nachgewiesen worden, wovon 162 akrokarpische und 81 pleurokarpische Laubmoose. Für Schweden werden *Andreaea Thedenii, Bryum comense* und *Bryum jemtlandicum* H. Pers. nov. spec. zum ersten Mal nachgewiesen. Die neue Art *Br. jemtlandicum* steht in der Nähe von *Br. microstegium, Br. misandrum* und *Br. sarckense.* Von *Br. microstegium* weicht sie durch kleinere Sporen, breiter durchlöcherte innere Peristomzähne, weitere Blattzellen usw., von *Br. sarckense* durch flache Blätträndер, niedrigeren Deckel usw. ab. Ausserdem werden als neue Varietäten beschrieben: *Grimmia apocarpa* var. *cucullata* n. var., *Oncophorus Wahlenbergii* var. *alpestris* n. var. und *Pohlia cucullata* var. *contracta* n. var. Verf. führt die kritische *Andreaea Thedenii* als besondere Art auf.

Von besonderem Interesse ist das Entdecken bei Handöl in Jemtland von der bisher nicht bekannten Frucht (leider aber nur einer einzigen) von *Astrophyllum hymenophylloides*; der Bau des Peristomes zeigt, dass die Art zur Gattung *Astrophyllum* (*Mnium*) und nicht zu *Cinclidium* gehört, wie früher vorgeschlagen worden ist. Verf. kritisiert eingehend die Annahme des englischen Bryologen Dixon, dass *A. hymenophylloides* von *Cinclidium hymenophyllum* nicht specifisch verschieden sei, führt jedoch die letztere Art wie Dixon und andere zur Gattung *Astrophyllum* (*Mnium*).

Am Ende teilt Verf. einige Tabellen mit, die die Verteilungen

der grösseren Gattungen usw. in den verschiedenen Regionen, die Fertilität und die Herkunft der Moose usw. beleuchten. Arnell.

Robinson, C. B., The geographic distribution of Philippine Mosses. (Philippine Journ. Science. C. Botany. IX. p. 199—218. 1914.)

In the distribution of the mosses one finds a large difference between the flora of the Mountain Province and the other areas. Among the mosses found in the Philippines, 111 are confined to the mountain province and 164 are not found in that part, 76 occur in both areas. When we consider the endemic species, 51 occur in the mountain province, 72 not and 13 are found in both areas.

The following table shows the occurrence of the non-endemic mosses in other regions:

Not endemic Philippine mosses occurring in the Philippines in:	Also in Malaya but not elsewhere	Not in Malaya	Both in Malaya and elsewhere
Mountain Province only	12	22	26
Not in Mountain Province	48	4	40
Mountain Province and elsewhere	17	4	42
	77	30	108

So far, then, as the moss flora can be taken as a criterion, it seems clear:

1 That the percentage of endemism in Philippine species is very high.

2 That the Mountain Province is botanically a natural subdivision of the Philippines.

3 That the flora of the rest of the Philippines is overwhelmingly Malayan.

4 That the flora of the Mountain Province can not be considered strictly Malayan but is related to it in much the same way as is that of Sikkim, Nepal or Khasia.

In the second part of the paper the author considers two important questions. 1. Whether any species of mosses, whose focus of distribution in the Philippines appears to be the Mountain province extend to the south along definite lines, in general those of the various ranges or broken ranges of mountains. There are 76 species found both in the Mountain Province and elsewhere in the Philippines, but 63 of these are known outside the limits of the Archipelago, and all except four of these are Malayan. The distribution in the Philippines of the thirteen endemic species is listed. A general consideration of the species of the genera concerned, as well as of the Philippine localities cited, appear to show that in two cases it is impossible to give an opinion as to the direction in which they migrated, for six species it is more likely, that they have originated farther south and thence migrated to the Mountain Province, for the remaining five it is more probable that they originated in that Province and thence have spread farther south, along two lines of distribution.

The second question is, whether floral subprovinces can be established for the rest of the Philippines. There seems to be much difference between the eastern and western provinces, but as some critical areas are yet bryologically inexplored, we must wait the results of further researches. Jongmans.

Brotherus, V. F., Die Laubmoose der Insel Lombok. (Elbert's Sunda-Expedition). (Meded. 's Rijks Herb. Leiden. 14. p. 15—30. 9 Textfig. 1913.)

Neue Arten und Varietäten: *Hymenostylium luzonense* Broth. var. *minus*; *Leptodontium humillimum* (Fig. 1); *Hyophila lombokensis* (Fig. 2); *Barbula* (*Eubarbula*) *Elbertii* (Fig. 3), kann mit *B. fallax* Hedw. verglichen werden; *B.* (*Eubarbula*) *pachydictyon*; *B.* (*Helicopogon*) *lombokensis* (Fig. 4); *B.* (*Helicopogon*) *divergens*; *B.* (*Hydrogonium*) *laxiretis* (Fig. 5), verwandt mit *B. cataractarum*; *Anoectangium lombokense* (Fig. 6); *Floribundaria* (*Trachycladiella*) *lombokensis*, verwandt mit *F. sparsa* (Mitt.) Broth.; *Gollania Elbertii* (Fig. 8), verwandt mit *G. varians* (Mitt.) Broth.; *Pleuropus brevisetus* (Fig. 9).

Abgebildet, jedoch nicht beschrieben, ist *Calyptothecium subcrispulum* Broth. (Fig. 7). Jongmans.

Campbell, D. H., The genus *Macroglossum* Copeland. (The Philippine Journ. Science. C. Botany. IX. p. 219—223. t. 1. 1914.)

This genus has been described by Copeland from Borneo. A comparison with *Angiopteris Smithii* Raciborski shows, that this species also belongs to *Macroglossum*. The two species of this genus are allied in many respects but can be easily distinguished. A comparison of *Macroglossum* with *Angiopteris* shows a number of notable differences. The habit of the plants is quite unlike, as *Macroglossum* much resembles the larger species of *Danaea*. The anatomy of the lamina is very different. A striking feature in *Macroglossum* is the development of a conspicuous ridge separating the elongated sori, so that the latter are sunk in a sort of trough, very much as is the case in *Danaea*. In *M. Alidae* only the upper portion of the sporangium is free. In *Angiopteris*, the sporangia are entirely exposed.

In *Macroglossum* there is a conspicuous indusium composed of branching hairs, which form a fringe on either side of the sorus. These indusial hairs are much less developed in *Angiopteris*.

The elongated sorus of *Macroglossum* present a quite different appearance from that of *Angiopteris*. The individual sporangia are smaller, but much more numerous than in *Angiopteris*.

The sporangia of *Macroglossum* are much less convex dorsally than in *Angiopteris*, and have an almost flat ventral surface.

The annulus is much less conspicuous in *Macroglossum*, and in *M. Alidae* it is almost entirely wanting.

There are also slighter differences in the distribution of the tannin cells on the surface of the sporangia.

The number, arrangement and structure of the sporangia are more like *Archangiopteris* than like *Angiopteris*.

The most obvious difference between *M. Alidae* and *M. Smithii* is in the number of sporangia in the sorus. The sori of *M. Alidae* contain twice as many sporangia than those of *M. Smithii*.

The leaf lamina in *M. Alidae* is somewhat thicker than in *M. Smithii*. *M. Alidae* has obscure pseudo-nerves between the veins. *M. Smithii* still possesses a true annulus in the sporangium, and the indusium is less developed than in *M. Alidae*. Jongmans.

Christensen, C., Filices Purdomianae. (The Botan. Gazette. LVI. p. 331—338. 1913.)

The paper contains an alphabetical list of the species in the collection of Mr. W. Purdom, collected in 1910 in Shensi during the Arnold Arboretum Expedition to northern China and remarks on some species with descriptions of the new forms.

Remarks on: *Adiantum aristatum* Christ, *A. erythrochlamys* Diels, *Cystopteris moupinensis* Franch., *Dryopteris lacera* (Thunb.) O. Ktze., *Gymnopteris bipinnata* Christ, *Polypodium clathratum* Clarke, *P. eilophyllum* Diels.

New forms: *Athyrium mongolicum* (Franch.) Diels var. *Purdomii*; *A. Sargentii*, a new species of the group of *A. acrostichoïdes* (Sw.) Diels, it stands between *A. Giraldii* Christ and *A. mongolicum*; *Cheilanthes lanceolata*, section *Aleuritopteris*, allied to *C. aurantiaca* (Cav.) Moore; *Dryopteris Purdomii*, section *Lastrea*, most like a narrow form of *D. brunneo-villosa* (Wall.) C. Chr.; *D. sericea*, section *Eudryopteris*, a most distinct fern, in its peculiar pubescence unlike all other species of the section, in general habit it resembles *D. cristata*; *Matteuccia intermedia*, a most critical form, intermediate between *M. struthiopteris* (L.) Tod. and *M. orientalis* (Hook.) Trev. It is possible that it is identical with *M. orientalis* var. *brevis* Christ; *Polystichum gracilipes*, closely related to *P. lanceolatum* (Bak., Diels; *Woodsia lanosa* Hook. var. *attenuata*, perhaps a new species. Jongmans.

Copeland, E. B., Hawaiian Ferns collected by M. L'Abbé U. Faurie. (The Philippine Journ. Science. C. Botany. IX. 5. p. 435—441. 1914.)

New Names: *Athyrium Mauianum, A. Kaalanum, Sadleria Fauriei, Asplenium Cooki, A. sectum* (Hilleb.) Copel. nov. comb. (*A. caudatum* Forst. var. *sectum* Hilleb.), *A. mirabile, A. nephelephyllum* Copel. nov. comb. (*A. dissectum* Brack. var. *kanaiense* Hilleb.), *Elaphoglossum Fauriei, E. crassicaule, Lindsaya macraeana* (H. et A.) Copel. nov. comb. (*Davalia macraeana* H. et A). Jongmans.

Copeland, E. B., New Papuan Ferns. (The Philippine Journ. Science. C. Botany. IX. 1. p. 1 - 9. 1914.)

New Names: *Cyathea* (*Alsophila*) *woodlarkensis, C. scabriseta, Dryopteris bipinnata, D. angusta, D. oblanceolata, D. uniauriculata, Tectaria gymnocarpa, T. Kingii, T. subaequale* Copel. nov. comb. (*Aspidium subaequale* Rosenst.), *Adianthum Kingii, Polypodium subreticulatum, P. Shawii, P. tenuissimum, P. glossophyllum, P. tenuinerve, P. tuanense.* A new subgenus of *Aglaomorpha*: *Holostachyum* with three species: *Aglaomorpha* (*Holostachyum*) *Buchanani* Copel. sp. nov., *A.* (*Holostachyum*) *Schlechteri* (Brause) Copel. nov. comb. (*Polypodium Schlechteri* Brause), *A.* (*Holostachyum*) *Hieronymi* (Brause) Copel. nov. comb. (*Dryostachyum Hieronymi* Brause). Jongmans.

Copeland, E. B., New Sumatran Ferns. (The Philippine Journ. Science. C Botany. IX. 3. p. 227—233. 1914.)

New Names: *Marattia caudata, Trichomanes pulcherrimum, Dryopteris paleata, Tectaria* (*Pleocnemia* vel *Arcypteris*) *olivacea, T.* (*Digrammaria*) *elliptica, Leptochilus ovatus, Athyrium Brooksii, Asplenium* (*Thamnopteris*) *oblanceolatum, Microlepia Brooksii, Davallia sumatrana, Pteris Brooksii, Vittaria* (*Taeniopsis*) *sessilis, Prosaptia semicrypta, Loxogramma Forbesii, Loxogramma Brooksii, Polypodium* (*Phymatodes*) *craspedosorum.*

New for Sumatra: *Tectaria singaporiana* (Wall.) Copel. (*Aspidium singaporianum* Wall.), *Humata intermedia* C. Chr., *Pteris furcans* Baker, *Monogramma trichoidea* J. Sm., *M. intermedia* Copel.

Jongmans.

Hieronymus, G., *Selaginellarum* species philippinenses. (Leaflets Philippine Botany. VI. Art. 101. p. 1987—2064. 1913.)

This paper contains the description of the collections of *Selaginella,* sent to the Berlin Botanical Museum by Elmer. A large number of important notes on synonymy and distribution have been added to those species which have been described formerly. In many cases biological or morphological details are given.

New names: *Selaginella Warburgii* nom. nov. (*Selag. microstachya* Warburg), *S. cupressina* (Willd.) Springer var. *aristulata, S. agusanensis, S. negrosensis, S. Perkinsiae, S. alligans, S. Mearnsii, S. pervaga, S. apoensis, S. cuernosensis, S. philippina* Spring. var. *longeciliata, S. Vidalii, S. Moseleyi, S. Hombroni, S. Llanoiis, S. Eschscholzii, S. aristata* Spring. var. *brevifolia* and var. *obtusifolia, S. Pikringii, S. Pouzolziana* (Gaud.) Spring. forma *typica* and var. *punctata* (A. Br.), *S. davaoensis, S. Usteri,* new description of *S. Engleri, S. Whitfordii* and *S. Wormskioldii* nov. spec. (without description).

Jongmans.

Hill, J. Ben, The anatomy of six epiphytic species of *Lycopodium.* (The Botan. Gazette. LVIII. p. 61—85. With 28 Text figures. 1914.)

Two New Zealand species, *L. Billardieri* Spring. and *L. varium* R. Br., two South African species, *L. verticillatum* G. f. and *L. Holstii* Hieron. and two from Samoa, *L. Phlegmaria* L. and *L. carinatum* Desv. are studied in this paper. In the introduction some notes on habitat and growth are given. The New Zealand material consisted entirely of mature stems and strobili, with no vegetative shoots. Roots were present in the material of *L. Billardieri.* The material of *L. verticillatum* consisted of several complete mature plants with both vegetative shoots and strobili, while that of *L. Holstii* was entirely vegetative. The two Species from Samoa were complete. From some species: *L. varium, L. Phlegmaria* and *L Billardieri* clay models were made of the xylem portions of the stele by studying serial sections.

The author published the following summary at the end of his paper.

It may be concluded that the species of *Lycopodium* studied are characterized by great variability in the development and structure of the stele. The radial stele may be considered as the prevailing type, and as the basis in most cases for modification to the other types found. There are found radial, parallel-banded, cres-

centic, and amphivasal steles in the same strobilus axis in *L. carinatum,* and all types but the amphivasal in *L. phlegmaria* and *L. varium.*

L. Billardieri is the most constant in its stelar structure, with a type of stele so characteristic as to make the species almost recognizable by the transverse section of the stem. The organization of the strobilus is distinctly radial. The structure of the stem consists of several radiating bands of xylem with phloem groups between them.

L. verticillatum has generally parallel-banded arrangement of stele, although the radial stele has been considered the prevailing type in epiphytic species.

All attempts to place the species of *Lycopodium* in definite categories based on the character of the stele are extremely uncertain (Jones, Holloway, Wigglesworth, Boodle), since there are exceptions in some species and even exceptions in different parts of the same stem in some species. If the character of the stele is in any way dependent upon varying conditions, its use in phylogeny must recognize this fact. The investigation confirms the idea that the radial arrangement of the stele, retained persistently by the root, is probably the most primitive stem arrangement, from which most known stems have departed. Jongmans.

Maxon, W. R., Studies of tropical American Ferns. 5. (Contrib. United States Nat. Herb. XVII. 4. p. 391—425. Pl. 11—23. Textf. 8—10. 1914.)

This contribution contains 9 different articles.

1. The American species of *Oleandra,* p. 392—398. A key to the american species of this genus and an enumeration with synonymy, notes on distribution and on published figures. Several new species are described: *O. guatemalensis, O. lehmannii, O. decurrens, O. panamensis, O. trinitensis* and *O. costaricensis.* Altogether eleven species of *Oleandra* are known at present from tropical America.

2. Notes upon *Polypodium duale* and its allies, p. 398—406. *Polypodium duale* belongs to a small group, which has been regarded by several writers in the past as constituting a separate genus, *Xiphopteris.* It is in many cases difficult to distinguish between *P. duale* and its allies, followed by a description, accompanied by full synonymy, lists of illustrations, notes on distribution, historical and systematical details. Following species are considered as belonging to the same group with *P. duale*: *P. myosuroides* Swartz (Pl. 11, fig. A, B, textf. 9), *P. delitescens* Maxon (*Grammitis myosuroides* Schkur, not *Polyp. myosuroides* Swartz) illustrated on Pl. 12, fig. A, B, and in Textf. 10, *P. strictissimum* (Hook.) Hieron., *P. saffordii* Maxon (*P. minimum* Brack, not Aubl.) and *P. wittigianum* (Fée et Glaz.) Christ. *P. duale* itself is illustrated in Texf. 8. *P. schenkii* Hieron. must be excluded from this group.

3. New species of *Polypodium,* p. 406—411. *P. hyalinum* from Costa Rica, a member of the group of *P. trichomanoides. P. blepharodes* from Costa Rica and Guatemala, belongs to the same group and is most nearly allied to *P. daguense* Hieron. and *P. taenifolium* Jenman. *P. cooki* Underw. et Maxon from Guatemala also of the *P. trichomanoides* group, but wholly unlike any of the American species thus far described. *P. perpusillum* (Pl. 13 A) collected in Brazil and named by Christ *P. setosum* Mett. (= *P. micropteris* C. Chr.).

It has however little in common with this species and is more nearly allied to *P. grisebachii* Underw. *P. shaferi* (Pl. 13 B) from Cuba, its nearest ally is *P. mitchellae* Baker, it is however not difficult to distinguish these two species. *P. mitchellae* is illustrated on Pl. 14. *P. rosenstockii* from Brazil, originally distributed as *P. pendulum* Swartz. It can scarcely be regarded as a near relative of this plant and is allied rather to *P. curvatum* Swartz.

4. Note upon *Pellaea arsenii* Christ. This plant, described from a single collection, is a common one in Mexico. In earlier collections specimens were distributed as *Cheilanthes microphylla* Swartz. and as *Pellaea seemanni* Hook. The writer gives the distribution in Mexico, all the specimens being in the U. S. National Herbarium.

5. A new *Psilogramme* from Porto Rico. *P. portoricensis* (Pl. 15). It differs widely from the other members of the small group to which it belongs. This group of *Psilogramme* is characterized by having several veinlets to each ultimate segment and veins which do not reach the margins.

6. A new species of *Hemitelia,* section *Cnemidaria,* from Panama. *H. rudis* (Pl. 16). In the venation of the largest pinnae it shows some approach to *H. grandis.* It is more nearly related to *H. subglabra.*

7. The North American species of *Hemitelia,* section *Euhemitelia,* p. 414—420. There are nine representatives of this section in North America. *H. elliottii* (Baker) Underw. MS. (*Alsophila elliottii* Baker) with description, known only from the mountains of Grenada. *H. sessilifolia* Jenman (Pl. 17), known only from Wilson's collections from Jamaica. *H. wilsoni* Hook. (Pl. 18) from mountains of Jamaica and Porto Rico. *H. sherringii* Jenman, from which as far as now one single plant has been found in Port Royal Mountains, Jamaica. It is illustrated on Pl. 19. *H. calolepis* Hook. (Pl. 20) known only from Cuba (Coll. Wright). *H. costaricensis* (Klotzsch) Mett. (Pl. 21) with synonymy and several notes on habitat and variation. It is known from Vera Cruz to Panama. *H. escuquensis* Karsten from Venezuela and Porto Rico. *H. multiflora* (J. E. Smith) R. Br. with full synonymy and notes on illustrations, distribution (Guatemala to Panama), nomenclature, variation in venation, position of sori and shape of segments. *H. muricata* (Willd.) Fée (Pl. 22), with synonymy, new description, based on new specimens from Guadeloupe and Martinique notes on nomenclature and synonymy. The specimen is apparently confined to Guadeloupe and Martinique.

8. Two new species of *Marattia* from Panama, p. 421, 422. *M. chiricana,* apparently somewhat similar to *M. interposita* and *M. pittieri.* Of this species only one single plant with but one frond has been found. It shows an undoubted affinity with *M. kaulfussi,* but differs greatly in several characters.

9. Notes on *Lycopodium,* p. 422—425. Some notes on specimens belonging to *L. dichotomum* Jacq. and *L. wilsonii* Underw. et Lloyd. *L. affine* Hook. et Grev. must be renamed on account of *L. affine* Bory from Bourbon. It is named now *L. blepharodes* Maxon nom. nov. It occurs in the mountains of Ecuador and Venezuela. Costa Rican specimens have been erroneously referred to this species and are regarded now as a new species *L. hoffmanni.* The differences between the two species are given. Another new species is *L. regnelli* Maxon (Pl. 23), from Brazil. It is a member of the

selago subgroup and is apparently well distinguished from related South American species by the contrasting direction of the leaves and sporophylls, the former being strongly divaricate from the stems, the latter imbricate and closely appressed. *L. hippurideum* Christ, known previously only from Costa Rica, has been found in Panama. *L. pithyoides* Schlecht. et Cham. has been found in Jalapa, Mexico. Plants distributed as *L. dichotomum* Jacq. in J. D. Smith, n⁰ 551, from Guatemala also belong to this species. *L. watsonianum* Maxon has been collected in Costa Rica. *L. cuneifolium* Hieron. also occurs in Panama. Some additional Costa Rican collections are mentioned. *L. subulatum* Desv. had not yet been recorded from North America. It occurs in Costa Rica and Panama. Jongmans.

Pickett, F. L., The development of the prothallium of *Camptosorus rhizophyllus*. (The Botan. Gazette. LVII. p. 228—238. Pl. XII, XIII. 8 Text figures. 1914.)

The spores of *Camptosorus rhizophyllus* germinate very irregularly in point of time. Prothallia bearing antheridia only and those bearing both antheridia and archegonia are produced. Both antheridial and archegonial prothallia show a wide variation in size and form, the result of a promiscuous cell division and growth. The formation of a typical V-shaped apical cell is rarely found, if at all, and the apical group is usually unsymmetrically placed. Old prothallia, bearing both antheridia and archegonia, may develop several marginal growing regions, and may even produce proliferations capable of independent growth. The archegonia follow the typical Leptosporangiatae in their development. The antheridia usually form a neck cell before the regular antheridial divisions.
Jongmans.

De Candolle, C., *Meliaceae.* (Nova Guinea. Résultats de l'Expédition scientifique néerlandaise à la Nouvelle-Guinée en 1907 et 1909, sous les auspices de Dr. H. A. Lorentz. Vol. VIII. Botanique. 6. p. 1011—1017. 1914.)

Neue Arten und Varietäten: *Dysoxylum brevipaniculum, D. Gjellerupii, D. Roemeri* mit forma *b; Chisocheton frutescens; Aglaia,* sectio *Hearnia: A. puberulanthera, A. brevipeduncula, A. Gjellerupii, A. polyneura, A. Roemeri*; sectio *Euaglaia*: *A. barbanthera* und *A. porulifera*; species incertae sectionis: *A. parvifoliola.* Jongmans.

De Candolle, C., *Piperaceae.* (Nova Guinea. Résultats de l'Expédition scientifique néerlandaise à la Nouvelle-Guinée en 1907 et 1909, sous les auspices de Dr. H. A. Lorentz. Vol. VIII. Botanique. 6. p. 1005—1010. 1914.)

Neue Arten und Varietäten: *Piper peracutilimbum, P. miniatum* Bl. forma *c, P. variipilum, P. truncatibaccum, P. parvipeduncul um, P. corylistachyum* C. DC. var. *β pubifolium* und *γ longantherum, P. rufum, P. Roemeri, P. protractispicum, P. squamuliferum, P. pallidilimbum, P. lineatipalum,* und *Peperomia tenuipila.* Jongmans.

Elmer, A. D. E., A fascicle of North Agusan Figs. (Leaflets of Philippine Botany. VII. Art. 112. p. 2359—2415. 1914.)

The first part of this paper contains the description of Elmer's

expedition through the Agusan Province, the second part field notes on the numerous species of *Ficus*, collected by him during this expedition, with description in english language of some new species. A list of the species, without new and newer species, and an analytical key to them, is given before the description. New names: *F. subalbida-ramea, F. williamsii epiphytica* n. var., *F. driveri, F. hispidulosa, F. bakeri, F. fulva, F. setibracteata, F. urdanetensis.* Jongmans.

Elmer, A. D. E., *Myrtaceae* from Mount Urdaneta. (Leaflets of Philippine Botany. VII. Art. 111. p. 2343—2358. 1914.)

This paper contains a number of new and some older species. New names: *Rhodomyrtus surigaoense, Eugenia livida, E. vaccinioides, E. binacag, E. vernonioides, E. holmani, E. bakeri, E. urdanetensis, E. agusanensis.* Jongmans.

Safford. W. E., The genus *Annona*: the derivation of its name and its taxonomic subdivisions. (Journ. Wash. Acad. Sc. I. p. 118—120. 1911.)

Annona, and not *Anona,* must be the name used for the name used the genus. It was published in the first edition of the Species Plantarum (1753) from which modern binomial nomenclature takes its origin; and it is equivalent to Plumier's genus *Guanabanus.* The name of the family must also preserve its original form *Annonaceae,* as published by Richard in 1808; not *Anonaceae* as published by Dunal in 1817 and by De Candolle in 1818.

In conforming with modern botanical usage the author proposes the following names for the subdivisions of the genus:

Section I. *Euannona.* As type *A. muricata*; contains further *A. montana, A. glabra, A. purpurea, A. uncinata.*

Section II. *Atta.* Type *A. squamosa,* and further *A. cherimolia, A. longiflora, A. reticulata, A. scleroderma.*

Section III. *Ilama.* Type *A. macroprophyllata,* and besides this *A. diversifolia.*

Section IV. *Annonella.* Type *A. globiflora,* and *A. palmeri.*

M. J. Sirks (Haarlem).

Sargent, C. S., *Plantae Wilsonianae.* An enumeration of the woody plants collected in Western China for the Arnold Arboretum of Harvard University during the years 1907, 1908 and 1910 by E. H. Wilson. (Publ. Arnold Arboretum, N°. 4, Pars III. p. 313—611, with Preface, Table of Contents and Index to Vol. I. 1913.)

In the *Plantae Wilsonianae* is found an account of the specimens collected by Wilson in his journeys 1906—1909 and 1910—1911, with descriptions of new species and varieties, and the enumeration of several important groups as they are represented in China. The first volume contains the enumeration of about one-half of Wilson's Arboretum collections. There are described two new genera, two hundred and twenty-five new species and one hundred and sixty-two new varieties of woody plants. A great part of the work has been done at the Arboretum, another part by a number of European specialists.

The third part of the book contains following families:

Trochodendraceae (Rehder and Wilson): *Eriptelea pleiosperma* H. et Th., *E. franchetii* Van Tieghem. A short enumeration of the characters of the three species of this genus is given at the end of the description.

Cercidiphyllaceae (Rehder and Wilson): *Cercidiphyllum japonicum* S. et Z. var. *sinense* R. et W. nov. var.

Ranunculaceae (Rehder and Wilson): *Paeonia delavayi* Franchet var. *angustiloba* R. et W. nov. var., a note on the habitat of *P. suffruticosa* Andrews, based on the studium of living plants introduced by W. Purdom. *Clematis.* A large number of species already mentioned in literature, is represented in the collections. To almost all of these notes on synonymy, habitat and distributions are added. New names: *C. pogonandra* Max. var. *pilosula* R. et W., *C. heracleaefolia* De Cand. var. *ichangensis* R. et W., *C. pterantha* Dunn var. *grossedentata* R. et W., *C. nutans* Royle var. *thyrsoidea* R. et W., *C. Armandi* Franch. f. *Farguhariana* R. et W., in the affinity of *C. Armandi* belongs *C. fulvicoma* R. et W., a new species of Yunnan from Henry's collection, *C. chinensis* Retzius f. *vestita* R. et W., *C. gracilifolia* R. et W., *C. montana* Buch.-Ham. var. *Wilsonii* Sprague f. *platysepala* R. et W., *C. Spooneri* R. et W., *C. apiifolia* De Cand. var. *obtusidentata* R. et W., *C. grata* Wall. var. *lobulata* R. et W. and var. *grandidentata* R. et W., *C. Gouriana* Roxb. var. *Finetii* R. et W., *C. brevicaudata* D.C. var. *lissocarpa* R. et W., var. *subsericea* R. et W., and var. *filipes* R. et W., the latter variety from Henry's collection, *C glauca* Willd. var. *akebioides* R. et W. nov. comb. (*C. orientalis* var. *akebioides* Max.), *C. tangutica* Korsh. var. *obtusiuscula* R. et W.

Lardizabalaceae (Rehder and Wilson). Beside a number of older species of *Decaisnea, Stauntonia, Holboellia, Akebia* and *Sinofranchetia* a new genus *Sargentodoxa* R. et W. is described. To this belongs *S. cuneata* R. et W. nov. comb. (*Holboellia cuneata* Oliver). One specimen of *Stauntonia* is probably a new species.

Berberidaceae (C. Schneider). New names: *Berberis dictyophylla* Franchet var. *epruinosa* S., *B. diaphana* Max. var. *circumserrata* S. (from W. Purdom's collection), with remarks on the characters by which *B. diaphana, B. macrosepala* H. f. et T. and *B. yunnanensis* Franchet can be distinguished. (*B. Tischleri* S., 1908, with new diagnosis), *B. Ambrozyana* S. from Veitch Expedition, *B. Asmyana* S., *B. Sargentiana* S., *B. Julianae* S., *B. Bergmanniae* S. and var. *acanthophylla* S., *B. Veitchii* S. from Veitch Expedition and *B. subacuminata* S., *B. Ferdinandi-Coburgii* S. and *B. Delavayi* S. from Henry's and Delavay's collections. To many of the older species, notes on habitat or corrections of the diagnoses are added. An analytical key of all the species of the section *Wallichianae* is given at the end of this part. To other sections of this genus belong: *B. Francisci-Ferdinandi* S., *B. Boschanii* S., *B. Silva-Taroucana* S., *B. Mouillacana* S., *B. Poiretii* f. *weichangensis* S., *B. Purdomii* S. and *B. Vernae,* the last three species from the collection of W. Purdom, *B. Lecomtei* S. from Delavay's collection, *B. dictyoneura* S., *B. polyantha* Hemsley var. *oblanceolata* S., *B. Prattii* S. and var. *recurvata* S., *B. Liechtensteinii* S. Among the specimens belonging to the genus *Mahonia,* four species are represented, from which three are new: *M. Zemansii* S., *M. decipiens* S. and *M. nitens* S. An analytical key of the species found in Asia and a critical enumeration with notes on Synonymy and distribution, are given at the end of this genus. In this enumeration some new species are described: *M. flavida, M. Fordii, M. Veitchiorum* nov. comb. (*Berberis Veitchiorum*

Hemsley et Wilson), *M. Sheridaniana* and *M. Leveilleana,* all from China. The genus *Nandina* is represented by *N. domestica* Thunb.

Menispermaceae (Rehder and Wilson) with two new names: *Sinomenium acutum* R. et W. (*S. diversifolium* Diels, *Menispermum acutum* Thunb.) and var. *cinereum* R. et W. (*S. diversifolium* var. *cinereum* Diels).

Magnoliaceae (Rehder and Wilson). *Magnolia:* A large number of new species and varieties is described, followed by an analytical key and a critical enumeration and the synonymy of the asiatic species of this genus. New names: *M. officinalis* R. et W. (*M. hypoleuca* Diels, non S. et Z.) and var. *biloba* R. et W., *M. globosa* H. f. et Thoms. var. *sinensis* R. et W., *M. Nicholsoniana* R. et W., *M. Wilsonii* Rehder, *M. aulacosperma* R. et W., *M. Dawsoniana* R. et W., *M. Sargentiana* R. et W. and var. *robusta, M. denudata* Desrousseaux var. *purpuracens* R. et W., and var. *elongata* R. et W. To the older species *M. denudata* and *M. liliflora* Desrousseaux interesting notes are added on the synonymy and on Thunberg's original specimens. The genus *Michelia* is represented by incomplete material which is not specifically determinable, the genus *Liriodendron* by *L. chinense* Sargent. Among the other *Magnoliaceae* must be mentioned: *Kadsura peltigera* R. et W., *Schisandra rubriflora* R. et W., *S. phenanthera* R. et W. with var. *pubinervis* and var. *lancifolia.*

Calycanthaceae (Rehder and Wilson): *Meratia praecox* R. et W. nov. comb. and var. *grandiflora* R. et W., with notes on the priority of the generic name *Meratia* Lois. (*Chimonanthus*) Lindley.

Hamamelidaceae (Rehder and Wilson): *Liquidambar formosana* Hance var. *monticola* R. et W., *Altingia yunnanensis* R. et W. from Henry's collection, *Corylopsis sinensis* Hemsley var. *glandulifera* R. et W. and var. *calvescens, C. Wilmottiae* R. et W., *C. platypetala* R. et W. and var. *levis, Fortunearia* new genus with *F. sinensis* R. et W. The other genera do not contain new species.

Eucommiaceae (Wilson) with *E. ulmoides* Oliver.

Rosaceae (Rehder): *Neillia ribesioides* R., and from Henry's collections: *N. sinensis* Oliver var. *caudata* R., and *N. pauciflora* R., *Spiraea hypericifolia* L. var. *hupehensis* R. (from Henry's collection), *S. fulvescens* R., *S. myrtilloides* R., *S. mollifolia* R., *S. laeta* R., with var. *tenuis, S. papillosa* R., *S. hirsuta* Schneider. var. *rotundifolia* R. nov. comb., *S. tortuosa* R., *S. ovalis* R., *S. Sargentiana* R., *S. aemulans* R., *S. Schneideriana* R., with var. *amphidoxa, S. canescens* G. Don var. *oblanceolata* R., *S. japonica* L. f. var. *stellaris* R. (from Henry's collection), *S. Fritschiana* Schneider var. *angulata* R., *S. Miyabei* Koidz. var. *glabrata* R., var. *pilosula* R. and var. *tenuifolia* R. (the latter from Veitch Expedition), *Sibiraea laevigata* Max. var. *angustata* R., *Exochorda racemosa* R. nov. comb. with var. *Wilsonii* and var. *Giraldii* (from several other collections).

Sorbus (E. Koehne): *S. expansa* K., (*S. Wilsoniana* Schneider with corrections and additions), *S. Esserteauiana* K., *S. Conradinae* K., *S. Sargentiana* K., *S. scalaris* K., *S. Helenae* K. with forma *subglabra* and forma *rufidula* K., *S. Rehderiana* K. with var. *grosseserrata* K., *S. aperta* K., *S. laxiflora* K., additions to the description of *S. hupehensis* Schneider, with var. *syncarpa* K., *S. Prattii* K. with f. *striata* and f. *laevis* K., *S. munda* K. with f. *tatsienensis* and f. *subarachnoidea* K., *S. aestivalis* K., *S. glomerulata* K., additions to the description of *S. Koehneana* Schneider, *S. multijuga* K. with var. *microdonta* K., *S. pogonopetala* K., *S. unguiculata* K., *S. setschwanensis* K. (*S. Vilmorini* var. *setschawensis* Schneider). At the

end of the descriptions an analytical key to the different chinese species is given.

Celastraceae (Loesener and Rehder): *Evonymus Aquifolium* L. et R., *E. japonica* Thunb. var. *acuta* R., *E. oblongifolia* L. et R., *E. kiautschovica* L. var. *patens* L. (*E. patens* Rehder), *E. Sargentiana* L. et R., *E. Rehderiana* Loes., *E. subsessilis* Sprague var. *latifolia* Loes., *E. mupinensis* L. et R., *E. yedoensis* Koehne var. *Koehneana* Loes., *E. saxicola* L. et R., *E. nanoides* L. et R., *E. verrucosoides* Loes. var. *viridiflora* L. et R., *E. alata* Regel var. *aperta* Loes., *E. sanguinea* Loes. var. *brevipeduncutata* Loes., *E. Giraldii* Loes. var. *angustialata* Loes., *E. dasydictyon* L. et R. and *E. elegantissima* L. et R.

Hippocastanaceae (Rehder): *Aesculus Wilsonii* Rehder and a complete description of *A. chinensis* Bunge, as far as it could be given based on the material in the Arnold Arboretum.

Clethraceae (Rehder and Wilson): *Clethra monostachya* R. et W.

Ericaceae (Rehder and Wilson). *Rhododendron,* subgenus *Lepidorhodium* Koehne, *R. Sargentianum* R. et W., *R. alpicola* R. et W., with var. *strictum, R. verruculosum* R. et W., *R. Edgarianum* R. et W., *R. nitidulum* R. et W. with var. *nubigenum, R. violaceum* R. et W., *R. Websterianum* R. et W., *R. flavidum* Franch. var. *psilostylum* R. et W., *R. longistylum* R. et W., *R. Davidsonianum* R. et W., *R. yanthinum* Bureau et Franch. var. *lepidantum* R. et W., *R. bracteatum* R. et W., *R. apiculatum* R. et W., *R. Searsiae* R. et W., *R. Amesiae* R. et W.; Subgenus *Eurhododendron* Max., *R. argyrophyllum* Franch. var. *cupulare* and var. *omeiense* R. et W., *R. longipes* R. et W.. *R. Thayerianum* R. et W., *R. Weldianum* R. et W., *R. ochraceum* R. et W., *R. Hunnewellianum* R. et W., Two other species, belonging to the same group, but not represented in Wilson's collections are *R. Monbeigii* R. et W., and *R. foveolatum* R. et W. From Wilson's collection *R. Williamsianum* R. et W., further *R. Purdomii* (Purdom's collection). To other groups belong *R. Fortunei* var. *Houlstonii* R. et W., (from Veitch Exped and Henry), *R. Openshawianum* R. et W.

No new species or varieties are described in the third subgenus *Azalea,* and in the genera *Enkianthus* and *Cassiope.* Among the specimens of *Pieris* one new variety is found: *P. ovalifolia* var. *elliptica* R. et W., and *P. villosa* var. *pubescens* R. et W. nov. comb. New names in the other genera are: *Gaultheria pyroloides* H. et f. Thoms. var. *cuneata* R. et W., *G. nummularioides* D. Don var. *elliptica* R. et W., *Arctous alpinus* Nied. var. *ruber* R. et W., *Vaccinium Donianum* Wight var. *laetum* R. et W., *V. iteophyllum* Hance var. *fragrans* R. et W., *V. Dunalianum* Wight var. *urophyllum* (from Henry's collection), *V. viburnoides* R. et W. (Veitch Expedition).

Loganiaceae (Rehder and Wilson): *Gardneria lanceolata* R. et W. (Veitch Exped.), *Buddleia stenostachya* R. et W., *B. Davidii* Franch. var. *magnifica* R. et W. nov. comb., var. *superba* nov. comb., var. *Wilsonii* nov. comb. and var. *alba* nov. var., *B. albiflora* Hemsley var. *Giraldii* R. et W. nov. comb., *B. nivea* Duthie var. *yunnanensis* nov. comb.. *B. alata* R. et W. (Veitch Exped.), *B. Henryi* R. et W. (from Henry's collection).

Scrophulariaceae (Rehder): *Brandisia laetevirens* R., and *B. glabrescens* R. (both from Henry's collection), *Paulownia glabrata* R. (from Purdom's collection), *P. thyrsoidea* R. and *P. recurva* R.

At the end of this part a number of corrections to previous parts are given. The more important corrections have been published already by Rehder, Mitt. Deutsch. Dendr. Ges., XXI, 1912, and

one of them, a new species of *Lonicera, L. nitida,* by Wilson in Gard. Chron., ser. 3, L, 102, 1911. Jongmans.

Anonym. Die Mohnkultur, Opium- und Samenproduktion mehrerer Länder. (Intern. agrar-techn. Rundschau. V. 7 p. 967—968. Wien, Wilh. Frick. 1914.)

Im äussersten Orient hat der Mohn (*Papaver somniferum*) in den letzten Jahren für die Produktion von Rauchopium an Bedeutung verloren. — In Australien liefert nur Victoria Opium u.zw. in den Jahren 1908—1912 nur 40,37 kg, und dieses darf nur zu pharmazeutischen Zwecken verwendet werden. — In China wurde beschlossen, vom Ende 1913 ab die Mohnkultur und die Einfuhr von Opium aus Indien ganz zu untersagen. Ab 1917 darf Opium in China nicht gesucht werden. — In Aegypten pflanzt man Mohn zur Gewinnung von Opium namentlich im Süden. Aus den Samen stellt man auch Speiseöl her. Die drei gepflanzten Sorten unterscheiden sich durch die Färbung der Samen: rot, gelb, dunkelbraun. Nach der Ueberschwemmung im Oktober wird das Feld gepflügt und die Saat gleich untergebracht; pro 0,42 ha braucht man 2 l Samen, die vorher mit feiner Erde vermischt werden. Einen Monat nach der Saat werden die Pflanzen so gelichtet, dass sie 15—20 cm Abstand von einander haben; 12 Tage später geschieht die Anhäufelung. Die Ernte erfolgt im 5. Monat nach der Saat; in die Kapsel wird eingeschnitten, den Tag darauf der erhärtete Saft gesammelt Der Einschnitt kann 3 mal wiederholt werden. Das Opium wird geknetet, in Brotform gebracht und dann 4—5 Tag an der Sonne gelichtet. Kulturfläche etwa 235 ha. Entweder wird der Mohn allein oder gemischt mit Weizen, Gerste, Zwiebel, *Trigonella Foenum graecum* oder *Carthamus oxyacantha* kultiviert. Die Kulturkosten sind recht hoch, da viel Handarbeit. Matouschek (Wien).

Clausen, R. E., Ettersburg Strawberries. (Journ. of Heredity. VI. p. 324—331. 1915.)

In this paper a number of remarkable results are reported, which Mr. A. F. Etter of Briceland, California has secured in thirty years of persistent and intelligent strawberry breeding. This success is due to thé fact that he has become thoroughly familiar with the material with which he is working and has evolved a method of strawberry breeding which has proved very effective in the production of new, superior varieties. Essentially this method is the same as that which has been adopted by a number of successful plant breeders, namely that of hybridization followed by thorough trial and careful selection. The work of selection is of course simplified in the strawberry by the fact that vegetative propagation may be used to perpetuate any particularly excellent individual, and that perhaps with very little likelihood of any subsequent deterioration. The selection in effect has been made through several generations, as is usually necessary before the desired combinations of characteristics are secured. While the new varieties thus secured have not yet been thoroughly tested, present indications are that many of them will prove highly successful under a variety of conditions. At any rate a successful method of attack in strawberry breeding has been discovered, and these Ettersburg hybrid strawberries are a successful application of that method. M. J. Sirks (Haarlem).

Hérics-Tóth, J. von und **A. von Osztróvsky.** Ueber den Wert und Gebrauch des Hirsemalzes. (Kiséri. Közlem. XVII. 1. p. 35—44. 2 Taf. Budapest 1914. Ungarisch, mit deutschem Resumé.)

Der genannte Malz ist dem Gerstenmalze gleichwertig. Im Weichbottich liegt die Hirse bis zu vollkommener Wasseraufnahme, oder sie wird früher herausgenommen und dann öfters begossen. Im ersteren Falle liegt die Hirse 5—7 Tage in der Weiche, wobei sich das Gewicht derselben um 35—50 % vermehrt. Die Nachteile liegen in folgendem: Grosser Gehalt an Verunreinigungen (Erde, Grassamen und andere Sämereien, Sporen von *Ustilago destruens*) man muss daher vorher reinigen. Gegen Schimmelbildung ist das Weichgut täglich 1—2 mal zu durchlüften. Im Schwitzkasten muss die Temperatur unter 30° C bleiben; die beste Mälzungstemperatur, kältere Führung verlängert ohne Schaden die Mälzung. Höhe des Malzbettes 20—33 cm. Das fertige Malz ist zu waschen. Im Betriebe hat Hirsemalz grosse Vorteile: Verhinderung der Schaumgärung, das Verhältnis zwischen gebildeter Maltose und dem Dextrin günstig, Alkoholausbeute gut. In den verschiedenen Körnerfrüchten ist die Struktur der verzuckernden Enzyme gleich. Ein Koenzym ist in den verschiedenen zum Maischen angewendeten Rohstoffen in genügender Menge enthalten. Das Diagramm der Diastasebildung der Hirse hat mit der Maisdiastasebildung Aehnlichkeit; nach Erreichung des höchsten Wertes der diastatischen Kraft fällt es rasch.

Matouschek (Wien).

Kraus, G., Kalidüngung und Getreidelagerung. (Landw. Jahrb. Bayern. p. 1—45. 2 T. 1915.)

Aus den ausführlichen Versuchen, die in der Nähe Münchens hauptsächlich an zwei Gerstensorten ausgeführt wurden, geht hervor, dass Lagerungen, soweit bei denselben die Nährstoffzufuhr bestimmend ist, durch Kalidüngung tatsächlich verhindert oder abgeschwächt werden können. Andererseits aber darf dem Kali diese Wirkung keineswegs allein zugeschrieben werden. Entscheidend ist die gesamte Zufuhr von Nährstoffen in bezug auf die Mengen an sich und in ihrem Verhältnis zu einander wobei in erster Linie das Mass der Stickstoffzufuhr von Einfluss ist. Im allgemeinen stellt sich die Sache so, dass die formativen Wirkungen von Kali stärkere Gaben davon voraussetzen und am meisten oder überhaupt erst in der Erhöhung der Eigenschaften der Standfestigkeit bemerkbar werden, wenn die Stickstoffernährung eine mässige ist. Es sind das alles relative Verhältnisse, die von Fall zu Fall verschieden liegen können. Die bei dem Hauptversuch gegebenen Nährstoffmengen betrugen pro Hektar 75 kg Phosphorsäure in Superphosphat, 140 kg Kali in 40 proz. Kalisalz und 24 bezw. 36 kg Stickstoff in schwefelsauren Ammoniak.

Boas (Weihenstephan).

Sprenger. Ueber Kultur der *Eucalyptus* am Mittelmeer. (Oesterr. Gartenz. X. 9. p. 129—130. Wien 1915.)

Die grössten, dem Verf. bekannt gewordenen Eucalyptenpflanzungen finden sich

1. bei der Trefontane nächst Rom, hügeliges Gelände; die Arten sind *E. amygdalina, leucoxylon, goniocalyx, globulus, obliqua* und andere.

2. Bei Malaga (Andalusien), feuchte Niederungen, bepflanzt zumeist mit *E. globulus* und *corynocalyx*.

Eucalyptus ist einer regelrechten Forstkultur zugängig, die Verjüngung geschieht durch Samen. — Die genannten Arten geben gutes Holz, ausser *E. globulus*. Letztere Art wächst nur in der Jugend schön und schnell, der Stamm wächst schief und schlecht, ist brüchig, fällt Stürmen zum Opfer. Ihr Holz ist nur Brennholz. Schatten geben alle Arten reichlich (die gegenteilige Angabe ist leider überall zu lesen), den dichtesten *E. calophylla*. Prachtbäume liefern *E. amygdalina, Stuartiana, viminalis*, das beste und meiste Oel liefern *E. oleosa, amygdalina, globulus, obliqua, goniocalyx, leuoxylon*. Zu Alleebäumen eignen sie sich wenig, doch sind schöne Alleen (2 m hohe Stämme mit dichten Kronen) auf den Gütern des Fürsten Oldescalchi bei Bracciano zu sehen, u. zw. der Art *E. amygdalinus* und *corynocalyx*. Die Triebe werden vom Baume immer wieder ersetzt, das Zuschneiden vertragen sie schlecht. Die Kronen sind in der Jugend zu beschneiden, die jungen Triebe mitten im Triebe zu kürzen, da wird die wilde Vegetation gezügelt. *E. globulus* ist sehr schwer zurückzuhalten, er muss hinaufwachsen. Bei den süditalienischen Bahnhöfen gibt es Anpflanzungen, die arg durch die Menschen leiden und unschön aussehen. In S.-Frankreich und Algier nimmt die Kultur der *Eucalyptus*-Arten zu.

Matouschek (Wien).

Putlani, E. von, Der Beinwelk (Comfrey) als Kulturpflanze. (Wiener landw. Zeit. LXIV. p. 209—210. Wien 1914.)

Schweinezucht- und Mastanstalten grösseren Stiles haben auch in Oesterreich die Pflanze *Symphytum asperrimum* im grossen angebaut, z. B. in Rumburg, Spillen und Aichhof in N.-Oest. In Melk daselbst bestehen grosse Plantagen, die schon Millionen von Stecklingen abgegeben haben. Es steht zu erwarten, dass die Pflanze sich überall einbürgern wird, namentlich im Inundationsgebiete der Flüsse. Die in Thüringen und Melk bestehenden veredelten Rassen dürften einen guten Grundstock für die Zukunft bilden.

Matouschek (Wien).

Vuillemin. L'abbé Léon Vouaux, 1870—1914. (Bull. Soc. mycol. France. XXXI. p. 10—13. Avec portrait. 1915.)

L'abbé Vouaux consacra sa vie à l'enseignement et aux recherches critiques et scientifiques. Spécialisé dans l'étude des Lichens et des Champignons, il avait acquis une place distinguée parmi les botanistes par la publication d'un Synopsis des Champignons parasites des Lichens. Il recueillait des observations destinées à un travail d'ensemble sur le parasitisme quand il mourut à Jarny.

P. Vuillemin.

Personalnachricht.

Dr. **M. J. Sirks** ist zum Leiter der Veredelungsabteilung der Samenhandlung Zwaan en de Wilpes in Scheemda (Groningen) ernannt worden.

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wassertale daselbst wird beschrieben und abgebildet; der Hexenbesen auf ihr ist sehr gross und wohl 16 Jahre alt. — Auf der Saignotte (1200 m) an der schweizerisch französischen Grenze beobachtete Helmbold (schriftliche Mitteilung) Hexenbesen, die von den dortigen Holzarbeitern gefürchtet werden, „die Bäume wären vom Schritt der Hexe berührt." Matouschek (Wien).

Fink, B. and **C. A. Richards.** The Ascomycetes of Ohio. II (Ohio State Univ. Bull. XIX. p. 35—70. pl. 3—6. June 1915.)

Dealing with the *Collemaceae,* comprising the genera *Synectoblastus, Collema, Leptogium* and *Mallotium,* and containing as new *Synectoblastus ohioensis* Fink, and *Leptogium plectenchymum* Fink & Rich. Trelease.

Graff, P. W., *Philippine Basidiomycetes,* II. (Philippine Journ. Science. C. Botany. IX. 3. p. 235—254. Pl. 2. 1914.)

The species, mentioned in this paper, are accompanied by notes on the synonymy and the distribution. In many cases additional notes to the original descriptions are given.

New names: *Polyporus benguetensis* (Murr.) comb. nov. (*Coltrichia benguetensis* Murr., *Polystictus benguetensis* Sacc. et Trott.), *Fomes subchioneus* (Murr.) nov. comb. (*Tyromyces subchioneus* Murr., *Polyporus subchioneus* Sacc. et Trott.), *Fomes unguliformis* (Murr.) nov. comb. (*Tyromyces unguliformis* Murr., *Polyporus unguliformis* Sacc. et Trott.), *Polystictus spadiceus* Jungh. var. *barbatus* (Murr.) nov. comb. (*Cycloporellus barbatus* Murr.), *Trametes Elmeri* (Murr.) nov. comb. (*Tyromyces Elmeri* Murr., *Polyporus Elmeri* Sacc. et Trott.), *Lepiota pulcherrima* nom. nov. (*L. candida* Morg. antedated by *L. candida* Copel., from which the type is lost), *L. sulphopenita, Tricholoma tenuis, Lentinus macgregorii* (Plate II), *Agaricus luzonensis, Stropharia radicata, Coprinus flos-lactus, Panaeolus papilionaceus* (Fr.) nov. comb. (*Agaricus papilionaceus* Fr. and other synonyms), *Calvatia lilacinum* (Mont. et Berk.) nov. comb. (*Bovista lilacina* (Mont. et Berk., *Lycoperdon lilacinum* Speg.).

New for the Philippine Islands: *Guepinia ramosa* Curr., *G. spathularia* (Schw.) Fr., *Cladoderris dendritica* Pers., *Fomes fastuosus* (Lév.) Cooke, *F. Korthalsii* (Lév.) Cooke, *F. pachyphloeus* Pat., *F. spadiceus* (Berk.) Cooke, *Polyporus cervino-gilvus* (Jungh.) Fr., *Polystictus dealbatus* (B. et C.) Sacc., *P. funalis* Fr., *P. inquinatus* Lév., *P. murinus* Lév.) Sacc., *P. spadiceus* (Jungh.) Fr., *P. vinosus* Berk., *Daedalea imponens* Caes., *Laschia calmicola* P. Henn. et E. Nym., *Lepiota cepaestipes* (Sow.) Quél., with additional notes to the description, *L. fusco squamea* Peck, *L. revealata* B. et Br., *Marasmius capillipes* Sacc., *M. erumpens* Mass., *M. Patouillardi* Sacc. et Syd., *M. siccus* Schw., *Lentinus praerigidus* Berk., *L. strigosus* (Schw.) Fr., *L. Woodii* Kalchbr., *Naucoria pediades* Fr., *N. semiorbicularis* (Bull.) Quél., *Galera siliginea* Fr., *Coprinus deliquescens* (Bull.) Fr., *C. fimbriatus* B. et Br., *C. nebulosus* Zoll. with additional remarks, *C. plicatilis* (Curt.) Fr., *C. stercorarius* Fr., *Cyathus montagnei* Tul., *C. plicatus* (Fr.) Tul., *Tylostoma exasperatum* Mont., *Geaster saccatus* Fr., *Bovistella aspera* (Lév.) Lloyd, *Lycoperdon pusillum* Batsch. *Scleroderma vulgare* Fr. Jongmans.

Sydow, H. and **P.**, Fungi from Northern Palawan. (Philippine Journ. Science. C. Botany. IX. 2. p. 157—189. 10 Fig. 1914.)

The fungi, recorded in this paper, were collected by E. D. Merrill. The region was hitherto unexplored botanically, and is exceedingly rich in *Pyrenomycetes*, while it is poor in *Uredineae*, *Ustilagineae* and *Discomycetes*.

New names: *Septobasidium subolivaceum*, *Meliola aglaiae*, *Balladyna melodori*, *Dimerosporina dinochloae*, *Henningsomyces philippinensis*, *H. pusillimus*, (*Eutypella Rehmiana* [P. Henn. et E. Nym.] v. Hoehn., new diagnosis), *Peroneutypella graphidioides*, *P. arecae*, *Didymella acutata*, *D. pandanicola*, *Merrilliopeltis parvula*, *Ophiobolus licualae*, *Anthostomella bicincta*, *A. coccoina*, *Rosellinia truncata*, *Amphisphaeria palawanensis*, *Melanomma philippinense*, *Phyllachora connari*, *Microdothella* nov. gen, *Dothideacearum* with *M. culmicola* (Fig. 1), *Heterodothis* nov. gen. *Dothideacearum* with *H. leptotheca* (Fig. 2), *Palawania* nov. gen. *Dothid.* with *P. grandis* (Niessl.) Syd. nov. comb. (Fig. 3), (*Microthyrium grande* Niessl., *Seynesia grandis* Winter, *S. calamicola* P. Henn. et E. Nym.) and *P. cocoes* nov. spec. (Fig. 4), *Stigmatodothis* nov. gen. *Dothid.* with *S. palawanensis* (Fig. 5), *Actinodothis* nov. gen. *Dothid.* with *A. piperis* (Fig. 6). *Aulacostroma* nov. gen. *Dothid.* with *A. palawanense* (Fig. 7), *Dictyothyrium giganteum*, *Micropeltella Merrillii*, *Stephanotheca* nov. gen. *Hemisphaeriacearum* with *S. micromera* (Fig. 8), *Asterina nodulifera*, *A. Dilleniae*, *A. lobulifera*, *Asterinella palawanensis*, *A. ramuligera*, *A. calami*, *Lembosia nervisequia*, *L. inconspicua*, *Morenoella memecyli*, *Phomopsis arecae*, *Centhospora garciniae*, *Phellostroma* nov. gen. *Sphaeropsidearum* with *P. hypoxyloides* (Fig. 9), *Ischnostroma* nov. gen. *Leptostromatacearum* with *I. Merrillii* (Fig. 10), *Pycnothyrium pandani*, *Aschersonia macularis*, *Colletotrichum areceae*, *Cercospora licualae*, *Cercosporina helicteris*, *Stigmella palawanensis*, *Exosporium calophylli*.

Jongmans.

Thaxter, R., New or peculiar *Zygomycetes*. 3: *Blakeslea*, *Dissophora*, and *Haplosporangium*, Nova genera. (The Botan. Gazette. LVIII. p. 353—366. Pl. 26—29. 1914.)

Blakeslea trispora nov. spec. appeared as an impurity in a transfer of *Botrytis Rileyi*. The larvae, attacked by the *Botrytis*, were found on cowpeas at Gainesville, Florida. A comparison is made between the new genus and *Choanephora*, with which it shows many similarities. The chief point of interest is that the conidia so characteristic of *Choanephorae* are here replaced by sporangiola similarly related to large spherical heads; and further that these sporangiola, in the life history of one and the same species, pass by almost insensible gradations to large typical solitary sporangia such as are produced normally by a species of *Choanephora*. The writer adds important remarks on the occurrence or non-occurrence of sporangia of the normal type in different allied genera.

Dissophora decumbens, on dung of wood mouse from vicinity of Cambridge, is very closely allied to *Mortierella*, but the peculiarities of the primary fertile hypha has seemed sufficient basis for generic separation.

Haplosporangium is also closely allied to *Mortierella*, but differs in the presence of highly differentiated often very long segments, from which arise peculiar sporangiophores bearing threadlike ter-

minations or lateral branches, on which are produced minute sporangia containing usually only one, sometimes two, spores. The genus also resembles *Dissophora* in possessing specialized structures from which the sporangiophores arise, but is clearly distinguished from the fact, that these structures are intercalary and determinate, as well as by its peculiar sporangia. In general appearance, and in the habit of producing its sporangiophores in a radiate fashion from the segments of repent filaments, it closely resembles certain hyphomycetous forms like *Hyalopus* or *Cephalosporium*. Two species are described: *H. bisporale* found on pig dung at Burbank, E. Tennessee, on dung of skunk and of field mice at Kiltery Point, Maine and on dung of squirrels at Intervale, New Hampshire. The second species *H. decipiens* occurred on dung of the curious cave-dwelling *Selenodon* from Hayti. It is distinguished by its roughened nodding sporangia, smooth spores, which are always solitary in the strain examined, and its slightly larger dimensions. Jongmans.

Bachmann, F. M., The migration of *Bacillus amylovorus* in the host tissues. (Phytopathology. III. p. 3—13. 1913.)

The first evidence of infection by *Bacillus amylovorus* in the tissues of fruit or shoot is a transparency around the point of inoculation, followed later by a browning in the same region. From her studies the writer concludes that this transparency is due to the removal of air from the intercellular spaces, this being replaced by the liquid in which the bacteria live. Doubtless this liquid is cell sap which has been extracted from the cells, thus causing them to lose their turgidity. The cells die, apparently because of a loss of water, although chemical changes in the protoplast may accompany this loss. The substances produced in the metabolism of the organs are, judging from the microscopic evidence, not at all strongly or quickly toxic in their effect on the cells. This is evident because the organisms are found abundantly between cells which to all appearance are entirely normal. The film of liquid in which the bacteria move is not extracted in such amount that it precedes the bacteria to any extent. It seems to the writer that at least all of the first changes in the cells which result from infection may be attributed wholly to a loss of water. However, it is possible that the disintegration of the tissues may result in poisonous products which later hasten the death of other cells.

As to the rate at which the bacteria may migrate, the paper gives no data. Watershoots of apple forty-eight hours after inoculation were fixed and when sectioned the organisms were found one-half inch from the point of inoculation. At this time there was only a slight transparency around the wound. The writer repeatedly found that tissues which are to all appearances healthy, contain many bacteria in the intercellular spaces.

In the cells of pear fruits there appears to be somewhat less granular material in the tissues which are diseased. In apple the writer has not observed a diminution in the amount of starch in the cells. The cellulose walls are not digested early, although it seems that digestion in some portions of the walls may have occurred to cause the broken places. If there is a process of cellulose digestion it certainly goes on very slowly and not uniform over all surfaces. It seems possible to explain the broken walls on a purely physical

basis. There is certainly a very great pressure exerted to cause the exudation of so much slime on the surface of twigs. The cortical cells of the bark are very close together and some force must be exerted to cause them to tear appart. It may be that the osmotic pressure of the substance in which the bacteria are found is sufficiently great to rupture the cell walls. Evidence of such pressure is found in the large cavities which are formed in the xylem, cortex or pith. These cavities are frequently rounded or oval and suggest an equal pressure in all directions. The result of a process of enzymic solution should be the gradual dissolution of the entire wall and not merely a tear at one place. There probably is such digestion of the walls to some extent but osmotic pressure is, in the writers judgment, a more important factor in their final rupture.

M. J. Sirks (Haarlem).

Gregory, C. T., A rot of grapes caused by *Cryptosporella viticola.* (Phytopathology. III. p. 20—23. 1913.)

The writers conclusions are:

The berries are attacked shortly before, and at maturity, by the same fungus that causes the dead-arm disease of the grape vine, producing a rot which in all its stages of development is very similar to black rot. On close examination the two can be distinguished, but the most apparent difference is that this fungus attacks the grapes only when nearly ripe, while the black rot ceases to spread extensively in New York vineyards after the first of August.

Cultural characteristics, the characters of stained sections, the presence of scolecospores, the sucessful inoculations in the stem which produce typical necrotic lesions, together with the reisolation of the same fungus from artifically infected tissue, all combine to show that this disease is produced by *Cryptosporella viticola.*

M. J. Sirks (Haarlem).

Jamieson, C. O. and **H. W. Wollenweber.** An external dry-rot of potato tubers caused by *Fusarium trichothecioides,* Wollenw. (Journ. Wash. Acad. Sc. II. p. 146—152. 1912.)

In order to prove the parasitic nature of *Fusarium trichothecioides* Wollenw., inoculation experiments have been carried on under controlled conditions in our greenhouses during the past two seasons. Potato plants, grown in sterilized soil, from selected and disinfected seed were used, and pure cultures of *F. trichothecioides* inoculated into the stem just above the surface of the ground. In twelve days a wilting of the foliage was noticed accompanied by a yellowing of the leaves and a discoloration of the tissue about the inoculation pricks. In three weeks time the fungus infection had produced effect upon the plants, shown in the wilted condition of the foliage, in the constriction of the stem at point of inoculation. Upon the surface of the discolored area could be seen a growth of of powdery slightly pinkish mycelium and spores. Microscopic examination and isolation showed this fungus to be *F. trichothecioides.* Pure cultures of this same *Fusarium* were later obtained from tubers produced upon a plant diseased through inoculation.

From results of other experiments it is clear that conditions of temperature, and moisture undoubtedly play an important part in the beginning and in the progress of infection, and a better understanding of these conditions may prove of great value in attempting

to control this dry rot disease especially among potatoes kept in storage.

The inoculation experiments have proved, that *F. trichothecioides* Wollenw. is a wound parasite, capable of destroying potato tubers. The disease is clearly differentiated from the wilt and dry rot ascribed by Smith and Swingle to *Fusarium oxysporum* Schlecht. M. J. Sirks (Haarlem).

Melhus, I. E., *Septoria pisi* in relation to pea blight. (Phytopathology. III. p. 51—58. 1913.)

Inquiries as to the cause of certain damages to the pea crop in Wisconsin led the wrlter to the study of this disease, that manifested itself as follows: (1) in the destruction of some or all the diseased plants early in June, following a spell of wet weather; (2) in injury to the stems of plants less severly attacked so that the pods did not fill or so that the plants wilted down and dried up during the hot weather in the early part of July, before the pods had reached sufficient maturity to be used for canning purposes.

In these cases *Ascochyta* was not present in any quantity, but another inperfect fungus, *Septoria pisi,* which has not heretofore, been reported as very destructive, was associated in great abundance. This led the writer to take up the study of *Septoria* in order to learn whether it might cause such symptoms as were noted in the field, as well as to learn its pathogenicity and distinguishing characters, so that it might not be confused with *Ascochyta pisi*

The artificial infection experiments show plainly that *Septoria pisi* attacks and kills both the leaves and stems of the pea when artificially infected and that the greatest injury results from stem infection. Symptoms like those found in the blighted fields have been produced, which suggests that the damage done in the open may well have been due, in part at least, to the *Septoria.*

The outdoor infection experiments showed that infection can be obtained on pea plants in the open and that syptoms like those found under field conditions develop.

The symptoms of *Septoria* and *Ascochyta* are described in detail; the position of *Mycosphaerella pinodes* (B. & Blox.) Johans. is regarded as doubtful, though there are some tests given as very suggestive as to the relations between this fungus and *Ascochyta pisi.*

M. J. Sirks (Haarlem).

O'Gara, P. J., A new disease of germinating wheat. (Science, n. s. XLII. p. 313—314. Sept. 3. 1915.)

Preliminary note on an unnamed species of *Podosporiella.*

Trelease.

O'Gara, P. J., Occurrence of the bacterial disease of Sudangrass in the Salt Lake Valley, Utah. (Science, n. s. XLII. p. 314—315. Sept. 3. 1915.)

Referring to *Bacillus Sorghi* on *Andropogon Sorghum Sudanense.*

Trelease.

Arnell, H. W. und **C. Jensen.** Mossvegetationen vid Tåkern. (Sjön Tåkern fauna och flora von K. Svenska Vetenskapsakademien herausgegeben. I. Stockholm. p. 1—37. 1915.)

Der See Tåkern in Oestergötland (Schweden) ist merk-

lich durch seine sehr reiche Vogel-Fauna. In der Mitte des vorigen Jahrhunderts wurde sein Wasser-Niveau gesenkt. Als nun eine neue Senkung des Sees in Frage gestellt ist, wodurch die ganze Existenz des interessanten Tåkern gedroht wird, hat die K. Schwedische Akademie der Wissenschaften eine allseitige Untersuchung des Tåkern in Gang gesetzt, um Klarheit zu winnen, welche naturwissenschaftliche Werte durch eine neue Senkung des Wassers gefährdet werden. Dabei wurde die Untersuchung der Moosvegetation den Verf. anvertraut.

In der Abhandlung wird zuerst die Moosvegetation auf den bei der früheren Senkung des Tåkern trockengelegten Ufern beschrieben. Sie bestehen zum grössten Teil aus einem trockenen, kalkreichen und steinigen Morän-Boden, dessen Phanerogamen Vegetation dürftig ist, der aber in bryologischer Hinsicht durch einen verhältnismässig grossen Reichtum an kalkholden Arten interessant ist. An den Teilen dieses Ufers, wo Bäume und grössere Sträucher ganz fehlen oder sehr licht auftreten, sind die gewöhnlichen Kalkstein-Moose vorherrschend, wie z. B. *Amblystegium filicinum, Ctenidium molluscum, Bryum pendulum, Leersia contorta, Ditrichum flexicaule, Swartzia montana, S. inclinata, Barbula rubella* usw.; hierzu kommt die für kalkreiche Gegenden eigentümliche Mischung von südlichen und nördlichen Arten, in welcher Mischung bei Tåkern die südlichen Arten durch *Barbula brevifolia, B. reflexa, Mollia inclinata, M. brachyodontia, Leersia rhabdocarpa* var. *leptodon* usw., die nördlichen Moose durch *Barbula curvirostris, Blindia acuta, Catoscopium nigritum, Hypnum plumosum* var. *turgidum* usw. vertreten sind. In seichten Vertiefungen, die zuweilen mit Wasser gefüllt sind, gedeihen massenhaft *Amblystegium lycopodioides* (an einer Stelle reichlich fruchtend), *A. Sendtneri, A. intermedium, A. scorpioides* usw. Die *Sphagnales* fehlen auf diesem Ufer völlig. An den hainartigen Stellen des Morän-Bodens ist eine Mehrzahl der soeben genannten Moose noch vorhanden, hier aber mit zahlreichen Moosen, die nur oder doch am besten an schattigen Lokalitäten gedeihen. Die erstgenannten Moose sind offenbar am Platz älter, als unmittelbar dorthin eingewandert, nachdem der Boden trockengelegt wurde, wogegen die anderen Moose später, als das Ufer allmählich mit Sträuchern und Bäumen bewachsen wurde, gekommen sind. Zwischen diesen 2 Gruppen von Moosen spielt sich ein interessanter Kampf ab, dessen Verlauf von den Wechselungen, welche die Beschattigung des Bodens unterworfen werden kann, bedingt wird. Die auf Steinen, Baumstämmen und auf schattigem Boden vorkommenden Moos-Arten sind übrigens nur solche, die im südlichen Schweden weit verbreitet sind.

Unterhalb des soeben beschriebenen Morän-Ufers kommt gewöhnlich eine Zone, in welcher der Boden aus Schwemmsand oder thonigem Dy besteht; hier findet man zuweilen, die hier oben erwähnten *Amblystegium*-Arten reichlich. In dem Wasser des Sees schwimmen *Riccia natans* und *Fontinalis antipyretica.*

Ferner wird die Moosvegetation der etwa 900 Har grossen, an den See anstossenden Moorbildung, Dagsmosse, beschrieben. Sie ist in der Mitte zu einem Hochmoor, das ringsum von Flachmoorbildungen umgeben ist, ausgebildet. Die Moosvegetation ist hier eine ganz andere; die *Sphagnales* sind in 13 Arten reichlich vertreten; die Lebermoose sind weit reicher an Arten, von welchen *Cephalozia compacta* (massenhaft), *C. connivens* und *C. macrostachya* verdienen erwähnt zu werden.

In der systematischen Aufzählung der Arten werden die im Gebiete gefundenen Formen von der *Aduncum*-Gruppe der Gattung *Amblystegium* etwas mehr eingehend behandelt. Arnell.

Arnell, H. W. und **C. Jensen.** Ueber drei kritische skandinavische Lebermoose. (Botaniska Notiser. p. 179—190. Mit Textfiguren. 1915.)

Bei der Untersuchung von Original-Exemplaren der drei hier unten genannten Moose sind die Verff. zu den folgenden Resultaten gekommen.

Martinellia squarrosula (Lindenb.) Lindb. (*Scapania squarrosula* Lindenb. 1852) ist nur eine sehr verkümmerte, submerse Form der *M purpurascens*. Bei Gribsö auf Sjaelland hat C. Jensen eine ähnliche submerse Form gesammelt; er sammelte daselbst allmähliche Uebergangsformen von dieser Form zu fast typischen *M. purpurascens*, welche auf Steinen oberhalb des Wassers wuchs.

Cephalozia affinis Lindb. 1882 ist, wie schon früher K. Müller gefunden hat, eine ausgezeichnete Art, die mit *C. media* am nächsten verwandt ist. Als Korrektionen der früheren Angaben weisen die Verff. nach, dass der unterste Teil des Kelches zweischichtig ist und dass die Cilien der Kelchmündung kürzer, als sie von K. Müller abgebildet worden, sind.

Riccardia fuscovirens Lindb. 1878 wird zu einer Varietät der *R. pinguis* degradiert, weil die von Lindberg betonten Kennzeichen (der dicke Thallus, die schuppige Calyptra, die schwächer gewundenen Elateren mit breiteren, schwächer gewundenen Spiren usw.) alle variabel und nicht konstant vereinigt sind. Arnell.

Brotherus, V. F., Musci novi philippinenses. II. (Leaflets of Philippine Botany. VI. Art. 99. p. 1973—1979. 1913.)

New Names: *Campylopus* (*Trichophyli*) *Copelandi, Chaetomitrium* (*Leiocarpae*) *Elmeri, Elmeriobryum philippinense* nov. gen., nov. spec. (*Gollonia philippinensis* Broth. in sched.), *Elm. assimile, Ectropothecium Elmeri, Mniodendron* (*Comatulina*) *mindanense, Schistomitrium subrobustum, Endotrichella Elmeri, Symphysodontella* (*Pseudo-Pterobryum*) *Elmeri, Macromitrium* (*Leiostoma*) *assimile, Trichostomum pervaginatum.* Jongmans.

Manning, F. L., Life History of *Porella platyphylla*. (The Botan. Gazette. LVII. p. 320—332. Pl. 15. 1914.)

The apical cell is pyramidal. Branches may arise from the latest segment of the cutting cell. The leafy body is dorsiventral and recumbent, with two dorsal leaves and one ventral leaf. The dorsal leaves have ventral lobes. The sex organs are borne on short lateral branches. The sporophyte is surrounded by a cluster of broad leaves.

The development of the Archegonium and the Antheridium could be studied in some details. Once an abnormal archegonium has been found. The archegonium arises as a papillate cell from the segment of the apical cell or from the apical cell itself. The antheridium also as a papillate cell from the segment of the apical cell, but never from that cell itself.

Of the sporophyte only mature stages were represented in the

material. Great variation in the shape of the foot was observed. There is no elaterophore, or any grouping of the elaters, but a general distribution of elaters through the capsule. Jongmans.

Mc Cormick, F. A., A study of *Symphyogyna aspera.* (The Botan. Gazette. LVIII. p. 401—418. Pl. 30—32. 1914.)

The material was collected in the vicinity of Xalapa and Texolo in Mexico. The writer could examine the thallus and the Sex organs. At the end of the paper the results are briefly summarized.

The thallus of *S. aspera* has a central strand of greatly elongated cells which taper at both ends. The walls of these cells have narrow pores which are spirally arranged. Like the other species of the genus, *S. aspera* is dioicous. The plants bearing antheridia are more slender and less freely branched than the plants bearing archegonia.

The antheridia are scattered over the thickened part of the thallus on the dorsal side. Each antheridium is surrounded by a scale.

The archegonia are in groups on the dorsal side of the thallus. Each group is on a padlike extension of the thallus and is surrounded by an involucre.

More than one embryo may be formed in a group, but so far only one has been found to reach maturity. As the embryo elongates, the calyptra and pad also elongate and the old archegonia are left in the tip of the calyptra. The young embryo develops by segmentation similar to that formed by a dolabrate apical cell.

The sporogenous tissue is differentiated relatively late in the history of the sporophyte. The cells which are to form elaters may early be distinguished from the cells which are ultimately to give rise to the spore mother cells. The former cells elongate without further division, while the latter cells undergo several divisions. The walls of the sporogenous mass of cells become gelatinized, and the protoplasts are potentially free in the gelatinous substance.

The spore mother cell attain their lobing by a slow amoeboid change of the protoplast, and in this movement vacuoles seem to play an important part. The examination of the living sporogenous tissue of other *Jungermanniales* verifies the occurrence of this phase in them also.

Spores with two nuclei have been found, though this is not a usual condition. Jongmans.

Melin, E., Die Sporogenese von *Sphagnum squarrosum* Pers. Nebst einigen Bemerkungen über das Antheridium von *Sphagnum acutifolium* Ehrh. (Svensk Bot. Tidskr. IX. 3. p. 261—293. 1 Taf. und 2 Textfig. 1915.)

Die Abhandlung umfasst 4 Kap., nämlich 1) Die Sporogenese von *Sphagnum squarrosum,* 2) Zur Kenntnis der Chromatophoren bei *Sphagnum,* 3) Einige Bemerkungen über das Antheridium von *Sphagnum acutifolium,* 4) Zur Kenntnis der systematischen Stellung von *Sphagnum.*

Die Resultate betreffs der Tetradenteilung sind im kurzen wie folgt. Die Sporenmutterzellen, die während ihrer ganzen Entwicklung sphärisch sind, enthalten in der späteren Prophase vier grosse

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